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APPENDIX TO THE JOURNALS

OF THE

SENATE AND ASSEMBLY

OF THE

FORTY-SECOND SESSION

OF THE

LEGISLATURE OF THE STATE OF CALIFORNIA

VOLUME V

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1917

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VOLUME V.

1—Report of State Board of Agriculture, 1915.
2—Report of State Board of Agriculture, 1916.
3—Report of Industrial Accident Commission, 1914–1915.
4—Report of Industrial Accident Commission, 1915–1916.
5—Report of Secretary of State, 1914–1916.
6—Report of State Board of Equalization, 1915–1916.
7—Report of Department of Engineering, 1914–1916.

STATISTICAL REPORT

OF THE

California

State Board of Agriculture

For the Year 1915

CALIFORNIA
STATE PRINTING OFFICE
SACRAMENTO

23436

STATE BOARD OF AGRICULTURE, 1915-16.

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GEORGE ROBERTSON	Statistican

REPORT

OF THE

STATE BOARD OF AGRICULTURE.

LETTER OF TRANSMITTAL.

July 1, 1916.

To Honorable Hiram W. Johnson,
Governor of California.

Dear Sir: We have the honor to submit herewith the Sixty-second Annual Report of the State Board of Agriculture pertaining to the California State Fair, together with the financial statement of the fiscal year ending June 30, 1916, and the statistical report of the productions of California for the calendar year of 1915.

The year of 1915 was the first in many years in which no State Fair was held in California. This board, in view of the greater field of exploitation taken by the Panama-Pacific International Exposition at San Francisco and the Panama-California Exposition at San Diego, decided not to hold a State Fair, which would be in the nature of a competitor and which would necessarily fail to attract the attention from the public that it deserved, in view of the greater diversity and far greater character of the World's Fairs in progress at the same time. That this conclusion was well founded is shown by the fact that other fairs in the State failed to meet the expectations of the directors, the attention of the people generally being centered on the greater enterprises.

Notwithstanding the decision that it was inexpedient to hold a State Fair in the year 1915, the State Agricultural Society was by no means an idle factor in the exploitation of California products at the great Expositions. Arrangements were made with the Chief of the Department of Live Stock at the Exposition at San Francisco, that such members of the staff of the State Agricultural Society, whose services would be of advantage at the Exposition, would join in that work, the expense being shared by the Society and the Exposition. In this way we kept closely in touch with all breeders of live stock in California, Oregon and Washington, who had been previous exhibitors at the California State Fairs, and were able to do much to aid them in getting the best results. Several race stakes, for which entries had been received in previous years, were transferred and contested at the Exposition track. The saddle horse futurities and other special events of that same nature were also put on at the Exposition, adding materially to the successful shows there. The methods of keeping records developed at our State Fair were utilized at the Exposition in the live stock department and were accorded a great deal of praise by representatives of live stock breed record associations, several of whom expressed the opinion that our State Fair compared favorably with the best in the country, and even went so far in some instances as to place it at the head.

The showing of California live stock at the Exposition was very creditable, and breeders in this State took advantage of every opportunity to procure blood lines from Eastern exhibitors that will tend to raise the standards of the several breeds in this State, and thus serve to give better and larger shows in the several classifications at our State Fairs. The degree of interest that the live stock industry developed at the Exposition will have the same tendency, and, in fact, we have assurance at this time that the live stock show at the 1916 State Fair will far excel in number and quality of animals that of any previous fair held in California. To accommodate these exhibits it will be necessary to provide additional buildings. This holds true of all kinds of live stock, but probably to a greater extent with the dairy cattle and swine. At the coming State Fair special inducements are offered through added cash prizes and futurity prizes in several swine classes that justify the claim of the Swine Breeders' Association that they will show over one thousand head of pure bred swine. We also find that it will be necessary to use all additional space provided in the Poultry Building, as the poultry show at the Exposition has caused a widespread interest among the fanciers throughout the State, and the State Fair will profit thereby.

The need of permanent additional accommodations at the State Fair is urgent. The growth of the Fair, especially in the increased showing of live stock from year to year, has taxed the capacity of the present grounds, and the new buildings to be erected this year will occupy all the available space. More land is today the essential need of the State Fair, and it is respectfully but urgently recommended that you consider the question of presenting this matter to the next session of the legislature with your endorsement of the necessary appropriation to procure suitable land adjoining the present grounds, and that steps be taken without delay to procure an option to buy such lands at a reasonable figure.

The directors in making a great change in the Vocational Department have inaugurated a new departure in the State Fair work, getting more closely in touch with the trend of the times to advance sociological conditions as well as the material development of the State. The premiums offered for vocational training by pupils of our schools are the largest in the records of the State Agricultural Society, and this board has every reason to believe that this feature will be one of the best that the Fair offers to the people of the commonwealth. In time we hope to have this part of the State Fair thoroughly representative of the life and industry of every portion of California. When this end is attained the State Fair will have reached its fruition as one of the best and most comprehensive reasons for its maintenance.

Another development in the work of the State Fair will find its home in the new Woman's Building, which is rapidly approaching completion and will be ready for the next State Fair. It will afford a safe home for works of fine arts, and it is hoped will become a permanent gallery for the best works of California talent. In addition, it will afford a center for the activities of the womanhood of the State, and will do much to hold the interest of every patriotic and enthusiastic citizen.

Material improvements have been made in the grounds of the State Fair. The period of inactivity gave opportunity to improve the lawns and gardens and to put the grounds in better shape than ever before. A substantial, attractive wire fence has been erected along the principal frontage, and a similar fence is being erected in front of the grand stands at the track. These add materially to the appearance of the grounds.

Another pleasing feature of our connection with the Panama-Pacific International Exposition was the beginning of a permanent exhibit at the Fair Grounds from donations by the commissioners representing the Governments of Argentine Republic, Japan, China, Sweden and other countries. It is the purpose to install these nonperishable products in one of the buildings in an attractive exhibit, which will be open for the benefit of visitors throughout the year. In course of time this idea may be amplified and the investment of the State in the Fair Grounds be justified by a greater use and greater benefit to all the people.

The development of the State Fair has progressed in all lines notwithstanding the fact that there was no show held in the year just closed. The exploitation of the products and resources of our State was not suspended, but was simply diverted for the time from the usual channel at the State Fair to the World's Expositions. Our people have learned newer and better methods of showing the products of their skill and industry, and the benefit of their experience in the competition of the world will be shown in the years to come in constantly improving and enlarging the State Fair. With aroused interest the work of the State Agricultural Society will constantly improve, and the purpose of the State Government in maintaining it will meet its best reward in the greater production and material advancement of the State and a greater degree of happiness and contentment for its people.

NUMBER AND VALUE OF FARM ANIMALS IN 1915 COMPARED WITH 1914.

During the past year there has been no change of importance in the number of farm animals. The number of horses show a falling off of from 503,000 in 1914 to 493,000 in 1915, but the average value remains about the same.

The number of pure bred certificated stallions and mares imported in 1914 for breeding purposes amounted to 1,210, of which number 524 were Percherons and 391 Belgian Draft; the total number imported in 1915 amounted to only 301.

The number of mules also shows a decline from 74,000 in 1914, to 70,000 in 1915, and the average value per head declined from $120 to $110. Milch cows shows an increase of 27,000, the number in 1914 being 541,000 and in 1915, 568,000, but the average value per head declined from $72 to $69.

Other cattle increased from 1,480,000 in 1914 to 1,554,000 in 1915, but the average value declined from $39.30 to $36.30 per head.

The number of sheep was 50,000 less than the previous year, the number in 1914 being 2,500,000, and in 1915, 2,450,000, but the average price of sheep of all ages increased from $4.50 to $5.00 per head. Swine show an increase of 70,000, the number being 877,000 in 1914 and 947,000 in 1915, but the average value declined from $10.50 to $8.40 per head.

IMPORTS AND EXPORTS.

The number of horses imported free for breeding purposes was 2,852 in 1914 and 12,406 in 1915. Other horses on which duty was paid numbered 22,912 in 1914 and 12,406 in 1915. The number of horses exported in 1913 was 29,356, value $4,217,928; in 1914, 92,923, value $17,461,687, and in 1915, 443,014, value $94,827,171. The figures for the last two years show the demand owing to the war in Europe. Of the number exported in 1915, 203,391 went to France, 104,273 to the United Kingdom, 95,951 to Canada, 3,829 to Mexico, and the balance of 35,570 to other countries.

The number of mules exported in 1913 was 5,075, value $797,370; in 1914, 9,771, value $1,675,130; and 1915, 122,006, value $23,825,924. On the other hand the number of sheep exported shows a large falling off during the last three years. In 1913 the number was 170,411, value $595,324; in 1914, 78,227, value $317,939; and in 1915, 40,501, value $171,361.

The number of cattle imported free for breeding purposes was 552,489 in 1915, compared with 727,891 in 1914. Of this number, as in the previous year, the greater number came from Mexico and Canada, the number from Mexico in 1915 being 304,744, and from Canada 244,913, and only 634 from the United Kingdom. The number of cattle exported in 1914 was 8,694; and in 1915, 16,253.

Of sheep, 199,995 were imported for breeding purposes in 1914; and 276,521 in 1915. No others were imported.

The number of hogs was not given separately in the custom returns until July 1, 1915, being included under the heading of "all other animals,'' but the number imported for breeding purposes from July 1 to December 31, 1915, was 3,578. The number of hogs exported was 12,399 in 1914, and 7,260 in 1915.

FARM CROPS IN 1915, COMPARED WITH 1914.

Farm Crops. The acreage and yield of farm crops varied considerably in 1915 compared with the previous year.

Cereals. In most years California produces more barley than any other state in the Union, but in 1915 it was slightly exceeded by North Dakota and Minnesota. The acreage in 1914 was 1,402,000, and in 1915, 1,360,000; the yield per acre was 30 bushels in 1914, and 29 bushels in 1915. The production in 1914 was 42,060,000, and in 1915, 39,440,000. The average farm price on December 1 was 59 cents in 1914, and 62 cents in 1915. The production of buckwheat is very small, there being only a few hundred acres. In corn the acreage shows a small increase, the area being 60,000 in 1914, and 64,000 in 1915, and the average yield per acre was 41 bushels as compared with 36 bushels in 1914. The total production was 2,160,000 in 1914, and 2,624,000 bushels in 1915. The average farm price per bushel on December 1, 1914, was 87 cents and in 1915 88 cents. In winter wheat there was an increase in the acreage of from 400,000 acres in 1914, to 440,000 in 1915. The yield per acre averaged one bushel less than in 1914, the quantity in that year being 17 bushels an acre, and 16 bushels in 1915. The total production amounted to 6,800,000 bushels in 1914, and 7,040,000 bushels in 1915. The average farm price on December 1 was $1.04 in 1914, and 95 cents in 1915.

In oats there was a falling off in the acreage of from 220,000 acres in 1914, to 211,000 acres in 1915. The yield per acre also declined from 35 bushels in 1914 to 33 bushels in 1915. The production was 7,700,000 bushels in 1914, and 6,963,000 bushels in 1915. The average farm price per bushel on December 1, was 53 cents in 1914, and 50 cents in 1915. Rye is always a small crop in California, the acreage the last two years being only 8,000. The average yield per acre was 17 bushels in 1914, and 14 bushels in 1915. The production amounted to 136,000 bushels in 1914, and 112,000 bushels in 1915. The average farm price on December 1 was 85 cents per bushel in 1914, and 90 cents in 1915.

The acreage in potatoes was 78,000, compared with 75,000 in 1914. The average yield per acre was 138 bushels in 1914, and 130 bushels in 1915. The production amounted to 10,350,000 bushels in 1914, and 10,140,000 bushels in 1915. The average farm price per bushel on December 1, was 70 cents in 1914, and 75 cents in 1915.

The acreage in sweet potatoes is small, the last two years amounting to 6,000 only. The yield per acre was 161 bushels in 1914, and 135 bushels in 1915. The total production was 966,000 bushels in 1914, compared with 810,000 in 1915. The average farm price on December 1 was 87 cents in 1914, and 80 cents in 1915.

In the production of hay, there was a falling off in the acreage and production, but a considerable rise in price. The acreage was 2,700,000 in 1914 and 2,511,000 in 1915; and the yield per acre, 1.95 tons in 1914, and 1.80 tons in 1915. The production was 5,265,000 tons in 1914, and 4,520,000 in 1915. The average farm price on December 1 was $8.20 per ton in 1914, and $11.20 in 1915.

MINOR CROPS.

The cultivation of rice keeps making steady progress, as also does cotton in Imperial Valley. In 1915, the acreage in Sacramento Valley amounted to 28,975, Butte County leading with 15,200 acres, Colusa being second with 8,750 acres. In the San Joaquin Valley there were 3,125 acres, Fresno County leading with 1,120 acres. There were 10 acres in Imperial, and 10 in Ventura counties, bringing up the total to over 32,000 acres. The total production of rice was approximately 888,000 sacks of 100 pounds each. In 1914 there were only 16,000 acres in rice, and the crop amounted to about 440,000 sacks.

Beet sugar shows an increase, the amount produced in 1914 being 338,135,600 pounds, and in 1915, 390,762,500 pounds. The number of factories operating in 1915 was 11, the acreage harvested 122,737 and the quantity of sugar beets worked 1,249,111 short tons.

Cotton. The cultivation of cotton in California has become of commercial importance within the past six years. In 1914 there were 15,000 acres in Imperial Valley, and in 1915, the area was about the same, owing to the financial depression in the previous season, when cotton sold at from 6 cents to 8 cents a pound. This year (1916) it is estimated that 50,000 acres have been planted.

The hop crop is a good one, amounting to 115,000 bales, of about 190 pounds, compared with 110,000 bales in 1914. The prices were lower, the highest being 14 cents a pound compared with 18 cents in 1914.

Tobacco was raised for a year or two, mostly in Fresno and Tulare counties, and also in Los Angeles County. At one time great hopes were entertained that it would become an important crop in California, and from 1909 to 1913 a certain quantity was raised, but lately the growers experienced much difficulty in disposing of their crop at a fair price, as the manufacturers claimed that the quality was poor and therefore its cultivation has practically been discontinued as a commercial crop. It is stated that a shipment equivalent to a carload of ''Turkish'' tobacco grown in Fresno and Tulare counties has recently been made to Australia as an experiment.

Imports and Exports. The quantity of breadstuffs imported is always very small, with the exception of rice, of which 290,144,034 pounds, value $6,372,295, were imported in 1915; and macaroni, vermicelli and similar preparations, of which 35,703,830 pounds, value $2,229,457, were imported in 1915. In the value of breadstuffs exported during the last two years, owing to the war in Europe, there has been an enormous increase, breaking all former records.

The exports of domestic beans and dried peas was also very large. In 1914, 597,925 bushels were exported, valued at $1,795,852; but in 1915 the quantity increased to 1,503,067 bushels, valued at $4,692,603.

PROGRESS IN FRUIT GROWING IN 1915.

Year by year the area in fruit continues to expand in nearly all sections in the State.

Figs are annually becoming a more important crop, the White Adriatic being the most important variety. In the production of peaches California far exceeds all other states, especially in those dried and canned, but Georgia ships more fresh peaches, California being second.

The cultivation of dates is also progressing, but the acreage is so broken up into small holdings that it is difficult to estimate the number, but it now amounts to several hundred. They are mostly grown in the Coachella Valley, in Riverside County, where ten to fifteen thousand pounds were produced in 1915. The crop will be much larger during the present year, owing to the increased acreage coming into bearing.

Olives continue to be largely planted, the production being about equally divided between southern California, and the northern and central counties.

The pack of pickled olives in 1915–16 was about one-third less than the previous season, but one-fourth more oil was manufactured. The prices paid to growers were considerably lower than in 1914.

In citrus fruits for the season of 1914-1915 there was a large increase in the shipments of lemons, and a falling off in oranges compared with the previous season. In southern California the number of cars of lemons was 6,843, compared with 2,924 for the season of 1913-1914, while the number of cars of oranges fell from 39,024 to 33,317. In northern and central California the oranges show a small increase of from 6,282 cars to 6,427 cars, but the shipments of lemons advanced from 78 to 225 cars.

The production of raisins beat all previous high records, amounting to the enormous total of 256,000,000 pounds, compared with 182,000,000 in 1914. The vineyards in raisin grapes now amount to about 170,000 acres. In other dried fruits the quantity of apricots amounted to 32,000,000 pounds, compared with 40,000,000 pounds in 1914; dried figs show an increase of from 10,000,000 pounds in 1914 to 14,000,000 pounds in 1915; dried peaches also show a decrease of from 70,000,000 pounds in 1914 to 56,400,000 pounds in 1915; dried prunes increased from 120,000,000 pounds in 1914 to 164,000,000 in 1915, and plums show an increase of from 1,500,000 pounds to 1,900,000 pounds. The shipments of fresh deciduous fruits compared with those for 1914 show very little change in the total number of cars. The number of cars of fresh apricots was 392, compared with 382 in 1914; cherries, 205 cars, against 166 in 1914; grapes increased from 8,773 cars in 1914 to 9,563 in 1915; peaches show a decline of from 2,144 in 1914 to 1,689 in 1915; pears 2,725 cars in 1914, and 2,646 in 1915; plums, 1,907 in 1914, and 2,225 in 1915. Miscellaneous fruits amounted to 49 cars in 1914, and 58 in 1915. The total number of cars amounted to 16,146 in 1914, and 16,778 in 1915, or a total increase of 632 cars.

WINE AND BRANDY.

Almost all of the sweet wine and brandy produced in the United States is made in California. New York and New Jersey make small quantities of port and sweet Catawba, North Carolina and Virginia scuppernong, and Ohio appears as a maker of sweet wines in 1915 for the first time in ten years, with 6,863 gallons of scuppernong and 1,015 gallons of sweet Catawba. The total production of sweet wine in the United States in 1915 was 17,168,698 gallons of which quantity California supplied 16,868,374 gallons, and all other states 300,324 gallons. Of fruit brandy California produced 7,906,380 gallons, and other states 615,571 gallons, or a total of 8,521,951 gallons in the United States.

Owing to the heavy tax on brandy for fortifying sweet wines the quantity fell off enormously last season, the quantity produced being only about one-fifth of the usual production of wine, and one-third of that of brandy. The quantity of wine made was only 3,882,953 gallons, the lowest since 1893; and of brandy 2,613,286 gallons, the smallest quantity since 1899.

In the imports and exports of fruits for the calendar year ending December 31, 1915, the exports of domestic fruits, as in other farm products, show a record increase both in quantity and value far exceeding all previous years.

The total value of all fruits and nuts during the above three years was, in 1913, $33,708,695; in 1914, $29,535,503; and in 1915, $37,746,584. The value of imports of fruits and nuts for the same period was, in 1913, $48,804,545; in 1914, $49,772,047; and in 1915, $40,427,623, a considerable falling off from the two previous years. The preceding figures are for the calendar year ending December 31, and are for the whole of the United States; but California has shared in this enormous business, as proved by the trade of California ports. The total value of imports of merchandise in 1914 amounted to $75,045,095, and in 1915 to $87,473,944, or an increase of $12,428,849. The exports in 1914 were valued at $68,235,361, and in 1915 to $85,033,293, or an increase of $16,797,932. In addition to this merchandise, gold was imported into San Francisco in 1915 to the value of $66,956,418, and silver to the value of $2,970,428. The exports in 1915 amounted to $1,532,844 in gold, and $8,105,143 in silver. Including gold and silver, the imports into California ports in 1915 amounted to $157,400,790, and the exports to $94,671,280, making a grand total of $252,072,070, by far the largest sum in the history of the state.

Respectfully submitted.

JOHN M. PERRY,
President.

CHAS. W. PAINE,
Secretary.

FINANCIAL STATEMENT.

July 1, 1915, to June 30, 1916.

SUMMARY.

RECEIPTS.

Balance on hand, State Treasurer	$8,661 96
Received from appropriation for statistics	5,243 70
Received from appropriation for directors' traveling expenses	810 40
Received from appropriation for salaries	8,850 00
Received from appropriation for aid	10,016 43
Received from appropriation for improvements and maintenance of grounds	4,250 00
Received from appropriation for deficiency directors' traveling expenses	145 85
Received from appropriation for Woman's Building	536 76
Received from appropriation for grand stands	48 00
Concessions	426 65
Stall rent	582 05
Park and Pavilion 1916 State Fair	10 00
Received on account of races	10,462 00
Storage	122 00
Refunded expense	659 46
Accounts receivable	1,215 72
Total	$52,040 98

DISBURSEMENTS.

Directors' traveling expenses	$890 25
Salaries	8,850 00
Races	9,927 83
Publicity	833 98
Pay roll	3,513 86
Labor	4,047 42
Postage	1,081 75
Stable expenses	433 30
Traveling expenses	1,058 71
Freight, cartage and expressage	100 55
Lights, power and water	863 69
Telephones and telegrams	256 09
Printing and stationery	1,318 21
Expense	8,609 20
Claims payable	1,790 65
Balance on hand, State Treasurer	8,475 49
Total	$52,040 98

STATISTICAL SUMMARY

OF THE

Production and Resources

OF

CALIFORNIA

BY

GEORGE ROBERTSON
Statistician

PREFACE.

The law under which this Report is prepared requires the annual collection, compilation, and distribution of statistics relating to the production and resources of the State. In the most important subjects the statistics are carried back for twenty-five years, but those who desire earlier date, will find it in the first Statistical Report, issued in 1911, where the statistics go back to the year 1850, when the State was first organized.

Statistics must cover a number of years to be of any real value, in order that comparisons may be made, and the measure of progress, or falling off, may be determined. Nothing can give a clearer or more precise idea of the development of a country than statistics, for figures speak more eloquently and convincingly than glowing literary descriptions, which are often exaggerated. In the business world today there are few things more valuable than reliable statistical data.

The various branches of agriculture and other subjects dealt with in this volume might be greatly extended, and much other information could be added, but the space available is limited by the amount of the appropriation of $5,000 per annum.

The statistics regarding population, area of farm lands, and the number of fruit trees, are compiled from the Reports of the Census, which contain the only reliable figures obtained by actual count, and not by incomplete estimates, which are often published, but upon which no reliance can be placed. Few people realize or understand the magnitude of such work, covering a state as large as California, or consider the time and number of men necessary to compile such details, but as an illustration, the pay alone of the enumerators employed by the Census Bureau cost upwards of $151,000 in this State.

Last year the Chambers of Commerce in three counties considered that the statistics given did not do them justice, being too low. A circular letter was, therefore, issued to the local authorities of all counties, requesting them to revise the summary of counties given in the Appendix, or to furnish an additional statement, themselves. Of the 58 counties only 17 responded, most of the others stating they had nothing to add; those received are now published. The great difficulty in obtaining reliable information from county sources is their tendency to exaggerate, and overestimate their productions and its value, which is misleading, and does far more harm than good.

The various sources of the statistics contained in this Report are the most trustworthy that can be obtained and the information has been brought down to the latest possible date. It contains a condensed summary of hundreds of federal and state reports, and other details obtained from a large number of correspondents in every industry from all parts of the State. All figures are for the fiscal year ending June 30th, except where otherwise stated.

Acknowledgments and expressions of high appreciation are due to the United States Department of Agriculture, Bureau of the Census, Department of Commerce, United States Geological Survey, Commissioner of Fisheries, Commissioner of Indian Affairs, General Land Office, National Conservation Commission, the United States Reclamation Service, the Commissioner of Internal Revenue, the Comptroller of the Currency, the Bureau of Corporations, the District Forester, United States Department of Agriculture, the United States Bureau of Plant Industry, Indio, and E. L. Adams, United States Biggs Cereal Field Station, Butte County.

Valuable assistance has been received from the California Associated Raisin Company, the Imperial Valley Long-Staple Cotton Growers' Association, California Cotton Mills Company, and many others.

The writer also desires to express his special obligations to Frank Adams, Irrigation Manager, University of California, Frank J. Snow, deputy collector, Internal Revenue Department of San Francisco. For the description of varieties of wine grapes and wine-making, acknowledgments are due Professor F. T. Bioletti, the viticulturist of the University of California; and to the large number of correspondents who have supplied special information not obtainable elsewhere.

Among the state departments, valuable assistance has been received from the State Controller's Department, the State Water Commission, State Mining Bureau, the State Fish and Game Commission, the Surveyor General, State Board of Forestry, Insurance Commissioner, Superintendent of Banks, Motor Vehicle Department, State Dairy Bureau , and the spelndid State Library at the Capitol.

GEORGE ROBERTSON,
Statistican.

Sacramento, California, July 1, 1915.

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Contra Costa County	289	San Bernardino County	367
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El Dorado County	294	San Francisco County	374
Fresno County	297	San Joaquin County	376
Glenn County	301	San Luis Obispo County	379
Humboldt County	303	San Mateo County	381
Imperial County	306	Santa Barbara County	384
Inyo County	309	Santa Clara County	387
Kern County	311	Santa Cruz County	389
Kings County	314	Shasta County	392
Lake County	317	Sierra County	395
Lassen County	319	Siskiyou County	397
Los Angeles County	321	Solano County	400
Madera County	326	Sonoma County	403
Marin County	329	Stanislaus County	406
Mariposa County	331	Sutter County	408
Mendocino County	333	Tehama County	410
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Colusa—Part taken to form Glenn in 1891.

Del Norte—Part annexed to Siskiyou between 1880 and 1890.

Fresno—Part taken to form Madera in 1893, and part annexed to Kings in 1909.

Glenn—Organized from part of Colusa in 1891.

Humboldt—Part of Klamath annexed in 1874.

Imperial—Organized from part of San Diego in 1907.

Kings—Organized from part of Tulare in 1893, and part of Fresno annexed in 1909.

Lake—Part annexed to Napa in 1872.

Los Angeles—Part taken to form Orange in 1889.

Madera—Organized from part of Fresno in 1893.

Modoc—Organized from part of Siskiyou in 1874.

Monterey—Part taken to form San Benito in 1874.

Napa—Part of Lake annexed in 1872.

Orange—Organized from part of Los Angeles in 1889.

Riverside—Organized from parts of San Bernardino and San Diego in 1893.

San Benito—Organized from part of Monterey in 1874.

San Bernardino—Part taken to form part of Riverside in 1893.

San Diego—Part taken to form part of Riverside in 1893, part taken to form Imperial in 1907.

Santa Barbara—Part taken to form Ventura in 1871.

Siskiyou—Part taken to form Modoc in 1874; part of Klamath annexed in 1874, and part of Del Norte annexed between 1880 and 1890.

Tulare—Part taken to form Kings in 1893.

Ventura—Organized from part of Santa Barbara in 1871.

INCORPORATED PLACES.

Bakersfield—Part of township 3 (Kern City) annexed in 1909.

Berkeley—Part of Oakland Township annexed in 1906 and 1908.

Fresno—Part of township 3 annexed in 1910.

Los Angeles—Parts of Ballona, Burbank, Cahuenga, and San Antonio townships annexed between 1890 and 1900; part of Ballona township annexed in 1906; part of Welmington township (including San Pedro City) annexed in 1909, and parts of Burbank and Cahuenga townships annexed in 1910.

Oakland—Parts of Brooklyn and Oakland townships annexed in 1909.

Ontario—Part of Ontario township annexed in 1901.

Pasadena—Parts of Pasadena township annexed in 1904 and 1906.

San Leandro—Part of Brooklyn township annexed in 1909.

Counties and County Seats. Acreage and Population.

County	County seat	Elevation county seats	Approximate acreage	Population of county seats, 1915†
Alameda	Oakland	36	468,480	185,000
Alpine	Markleeville	*	496,640	309
Amador	Jackson	1,975	384,640	2,500
Butte	Oroville	250	1,102,080	3,300
Calaveras	San Andreas	*	657,280	‡
Colusa	Colusa	60	729,600	2,000
Contra Costa	Martinez	125	456,960	3,000
Del Norte	Crescent City	50	655,360	1,200
El Dorado	Placerville	1,875	1,121,920	2,150
Fresno	Fresno	293	3,808,000	45,000
Glenn	Willows	136	805,760	3,000
Humboldt	Eureka	64	2,325.760	15,000
Imperial	El Centro	—2	2,616,960	6,000
Inyo	Independence	3,907	6,412,160	‡
Kern	Bakersfield	404	5,121,920	19,220
Kings	Hanford	249	741,760	6,250
Lake	Lakeport	*	817,920	1,100
Lassen	Susanville	4,175	2,899.840	1.000
Los Angeles	Los Angeles	293	2,602,880	550,000
Madera	Madera	272	1,351,680	3,300
Marin	San Rafael	*	338,560	6,000
Mariposa	Mariposa	*	936,320	‡
Mendocino	Ukiah	620	2,209,920	2,600
Merced	Merced	173	1,276,800	4,000
Modoc	Alturas	4,460	2,446,720	1,500
Mono	Bridgeport	6,500	1,939,200	‡
Monterey	Salinas	40	2,131,200	5,000
Napa	Napa	20	501.120	6,500
Nevada	Nevada City	2,580	623,360	3,000
Orange	Santa Ana	137	508,800	14,500
Placer	Auburn	1,360	892,800	2,366
Plumas	Quincy	3,400	1,660,160	‡
Riverside	Riverside	851	4,633,600	19,000
Sacramento	Sacramento	71	629,120	75,000
San Benito	Hollister	284	890,880	2,500
San Bernardino	San Bernardino	1,054	12,900,480	18,000
San Diego	San Diego	93	2,701,440	90,000
San Francisco	San Francisco	207	27,520	530,000
San Joaquin	Stockton	24	926,720	42,000
San Luis Obispo	San Luis Obispo	201	2,133,760	6,500
San Mateo	Redwood City	8	286,080	3,500
Santa Barbara	Santa Barbara	130	1,753,600	15,000
Santa Clara	San Jose	95	849,920	34,000
Santa Cruz	Santa Cruz	20	278,400	13,600
Shasta	Redding	552	2,469,120	4,800
Sierra	Downieville	3,150	590,720	‡
Siskiyou	Yreka	2,635	4,003,840	1,500
Solano	Fairfield	12	526.080	1,000
Sonoma	Santa Rosa	181	1,009,280	11,000
Stanislaus	Modesto	90	928,000	7,200
Sutter	Yuba City	57	389,120	1,700
Tehama	Red Bluff	307	1,851,520	5,072
Trinity	Weaverville	2,046	2,026,240	‡
Tulare	Visalia	334	3,107,840	6,000
Tuolumne	Sonora	1,825	1,401,600	2,029
Ventura	Ventura	43	1,201,920	3,500
Yolo	Woodland	58	648,960	5,000
Yuba	Marysville	67	408,960	6,000
Totals			99,617,280	
Estimated population of the State				2,757,895

*Not ascertained. †Estimated. ‡Not reported. These are small towns with a population of a few hundred.

THE STATE OF CALIFORNIA.

(Date of organization as a State, September 9, 1850.)

PART I.

AREA AND POPULATION.

Vacant Public Lands; Homesteads; Indian Reservations; School Lands; Population by Counties, 1850-1910; White and Colored Population; Population of Incorporated Cities and Towns, 1910-1915; Foreign-Born Population; Japanese Statistics; Color and Nativity of Farmers.

The State of California is about 780 miles in length; its breadth varies from 150 to 350 miles and its total area is 158,297 square miles, of which 2,645 are water surface. In size it ranks second among the states of the Union, Texas being the only one to exceed it, and it is larger than the nine states of New York, New Jersey, Rhode Island, Massachusetts, Maine, Vermont, New Hampshire, Connecticut and Ohio, combined. The coast line is more than 1,000 miles long.

California has the highest and lowest land of the United States, the greatest variety of temperature and rainfall, and of products of the soil. The spread of irrigation and of intensive cultivation, and the increase of small farms during the last twenty years, have made California what it is today.

Agriculture had its beginning in wheat raising on great ranches, from fifty to several hundred thousand acres in extent; then deciduous orchard fruits and semitropical citrus fruits, successively.

Both the Spanish and Mexican governments made large grants of land to encourage settlement. These were used as cattle ranches exclusively, up to the time of the American occupation, and the exports consisted entirely of hides and tallow. These grants covered the valleys of the State to a large extent, and later were recognized and patented by the United States Government. About 500 of these claims, covering nearly nine million acres, were found to be valid.

Of the fifty-eight counties into which the State is now divided, the first twenty-seven were organized on the 18th of February, 1850; ten years later the number had increased to forty-two. In 1872, Ventura became the fiftieth county, and Imperial, the latest addition, was formed in 1907.

The land area of the State is about 99,898,880 acres, a great part of which is rough, mountainous country and desert, roughly classified as follows:

Land surface		Water surface		Total	
Square miles	Acres	Square miles	Acres	Square miles	Acres
155,652	99,898,880	2,645	1,692,800	158,297	101,310,080

Approximately one-half of the land surface of the State is under the control of the Federal Government, including 19,532,731 acres in the National forests, on January 1, 1916. The areas designated as "National Forests" were formerly called "Forest Reserves," but the title was changed by act of Congress of March 4, 1907. In 1908 the amount of swamp and overflow land was 1,850,000 acres.

Indian Reservations, Years ending June 30, 1912-1915.

Area—Unallotted.

1912		1913		1914		1915	
Acres	Square miles	Acres	Square miles	Acres	Square miles	Acres	Square miles
364,743	569	364,743	569	430,102	672	430,136	672

Indian Population, Years ending June 30, 1890-1915.

1890	1900	1912	1915
12,108	11,431	17,517	15,034

Public and Indian Lands Originally Entered, Years ending June 30, 1902-1915.

(In acres.)

1902	655,966	1909	1,290,579
1903	957,507	1910	1,214,348
1904	986,253	1911	1,064,644
1905	1,032,758	1912	872,301
1906	809,811	1913	937,230
1907	579,294	1914	878,874
1908	766,932	1915	1,001,663

Original Homestead Entries, Years ending June 30, 1902-1915.

(In acres.)

1902	315,784	1909	216,699
1903	300,968	1910	278,700
1904	266,317	1911	1,062,005
1905	262,973	1912	871,381
1906	211,567	1913	381,129
1907	173,438	1914	393,702
1908	235,816	1915	498,477

National Parks and National Monuments.

There are three National parks and five National monuments in California. The former were created by acts of Congress and the latter by proclamations of the President. The name of each, with the date of creation and present area, is shown by the following table:

Name	Date created	Area, acres
Yosemite National Park*	Oct. 1, 1890	719,622.40
Sequoia National Park†	Sept. 25, 1890	161,597.00
General Grant National Park	Oct. 1, 1890	2,536.00
Devil Postpile National Monument	July 6, 1911	800.00
Lassen Peak National Monument	May 6, 1907	1,280.00
Cinder Cone National Monument	May 6, 1907	5,120.00
Muir Woods National Monument	Jan. 9, 1908	295.00
Pinnacles National Monument	Jan. 16, 1908	2,080.00

*Boundary changed by Congress in 1905 and again in 1906.
†Boundary changed by Congress October 1, 1890.

Lands Certified or Patented on Account of Railroad Grants, Years ending June 30, 1902-1915.

(In acres.)

1902	9,587	1909	589,000
1903	76,089	1910	364,084
1904	347,258	1911	442,879
1905	426,951	1912	23,995
1906	318,986	1913	--------
1907	100,971	1914	1,040
1908	3,897	1915	313,741

Vacant Public Lands—Areas Unappropriated and Unreserved, Years ending June 30, 1890-1915.

(In acres.)

Year	Surveyed	Unsurveyed	Total
1890	38,750,564	15,172,154	53,922,718
1900	34,423,923	8,043,589	42,467,512
1912	17,671,839	5,343,499	23,015,338
1913	15,633,304	5,220,333	20,853,637
1914	16,183,344	4,719,408	20,902,752
1915	16,244,018	4,391,905	20,635,923

Total Public Lands Unappropriated and Unreserved, Surveyed and Unsurveyed—1900-1915.

(In acres.)

Year	Surveyed	Unsurveyed	Total land area
1900	34,423,923	8,043,589	42,467,512
1914	16,183,344	4,719,408	20,902,752
1915	16,244,018	4,391,905	20,635,923

VACANT PUBLIC LANDS.

Practically all the vacant public land which is easily accessible has been already taken up, the areas now remaining being situated at a considerable distance from towns or villages, or in remote mountain valleys.

Before entry, personal inspection of the lands should be made to ascertain if they are suitable, and when the applicant is satisfied on this point, entry can be made at the local land office. Information regarding vacant land in any district can be obtained on application to the register and receiver of the proper local land office, who will give full information regarding vacant land and the steps necessary to be taken in making entry. All vacant unappropriated public lands, nonmineral and nonsaline in character, are subject to entry under the homestead laws.

WITHDRAWAL FROM SALE OF SCHOOL LANDS.

The sixteenth and thirty-sixth sections of school land belonging to the State, not situated within United States reservations, were withdrawn from sale by an act of the legislature, approved January 22, 1912, to permit of their examination and appraisement by the State Conservation Commission, and by an act of the legislature approved April 21, 1913, the withdrawal of said land was continued in force.

The acreage of school lands still unsold amounts to 614,023. Ten counties, including San Francisco, contain no state land.

According to the list of the counties that contain any school lands whatever, Merced has the smallest amount, 20 acres, and San Bernardino the greatest, 244,964 acres. Most of this, however, is desert area, incapable of producing agricultural products.

The acreage of vacant lands in the counties is as follows:

School Lands Still Unsold.*

County	Acres	County	Acres
Alpine	120	Placer	955
Amador	160	Plumas	520
Butte	2,185	Riverside	20,738
Calaveras	720	San Benito	549
Colusa	600	San Bernardino	244,964
Del Norte	320	San Diego	16,944
El Dorado	1,920	San Luis Obispo	3,647
Fresno	440	Santa Barbara	129
Glenn	440	Santa Clara	1,777
Humboldt	1,128	Santa Cruz	75
Imperial	24,010	Shasta	14,120
Inyo	132,487	Sierra	1,160
Kern	9,395	Siskiyou	8,204
Lake	7,451	Solano	283
Lassen	44,992	Sonoma	605
Los Angeles	594	Stanislaus	1,280
Madera	600	Tehama	7,800
Mariposa	2,331	Trinity	4,462
Mendocino	6,953	Tulare	1,150
Merced	20	Tuolumne	1,274
Modoc	16,186	Ventura	80
Mono	22,297	Yolo	480
Monterey	4,420	Yuba	510
Napa	1,903		
Nevada	640	Total	614,023

*Fractions of acres are omitted, but included in the total acreage.

The ten counties having no unsold school lands left are: Alameda, Contra Costa, Kings, Marin, Orange, Sacramento, San Francisco, San Joaquin, San Mateo, and Sutter.

Chapter 395, Statutes of California, 1915, provides for the sale of school lands suitable for cultivation to actual settlers. The determination of whether the land sought to be purchased is suitable for cultivation lies with the Surveyor General and the State Board of Control, as does also the fixing of the price, which is determined by examination and appraisement in each particular case.

School lands *not suitable for cultivation* will be sold pursuant to the provisions of chapter 389, Statutes of California, 1915, at public auction, to the highest bidder.

Homesteads.

Any person who desires to obtain a homestead must be a citizen of the United States or have declared his intention to become such, over the age of twenty-one years, and not the proprietor of more than 160 acres of land in the United States.

Six months from the date of filing is allowed to establish a bona fide residence on the homestead, which from that time to the date of the final proof must be the home of the applicant to the exclusion of a home elsewhere.

The period of residence was reduced in June, 1912, from five to three years, from the time of establishing actual permanent residence upon the land.

The settler must show that he has cultivated one-sixteenth of the area of the land, beginning with the second year from date of entry, and one-eighth of the area the following year and until proof is submitted. A mere breaking of the soil will not meet the terms of the law, but such breaking and stirring of the soil must be accompanied by planting or the sowing of seed and tillage for crops other than native grasses. If his proof is satisfactory, and the Government, after investigation, finds that he has complied with the law in good faith, his entry will be clear-listed, and in due time he will receive a patent for the land.

The homesteader may, before three years, by paying the purchase price of the land, at the rate of $1.25 per acre if it is situate outside the limits of a railroad grant, and at the rate of $2.50 per acre if it is within the granted limits of a railroad, offer what is known as commutation proof, which must show at least fourteen months of actual and substantially continuous residence, with bona fide cultivation and improvement of the land, immediately prior to his application to make such proof.

The United States Land Office fees and commissions for filing on 160 acres are $16.00, if the land is outside of the limits of a railroad grant; if inside the granted limits of a railroad they would amount to $22.00. The fees and commissions are computed upon the acreage of the tract entered.

The final proof commissions on 160 acres would be $6.00, if the land is outside a railroad grant, and $12.00 if inside the limits of a grant. Added to this are fees ranging from $2.00 to $4.00, based upon the number of words of testimony in the proof. There are no other fees or commissions required of a homesteader by the Government.

Those who commute their homesteads must pay the purchase price of the land in addition to the above fees, except the final proof commissions, which are not required on commuted homesteads.

The following summary, based on reports furnished by the district land offices, show, by land districts, and counties, the area of unappropriated and unreserved public lands, surveyed and unsurveyed, and a brief description of the character of the vacant lands. The General Land Office can furnish no more definite information as to the location and character of the vacant lands than is here given. Inquiries regarding the climate and soil in any given vicinity may be addressed to the Department of Agriculture.

A township diagram, showing only entered lands in any township, can be procured by sending $1.00 to the register and receiver of the land office of that district. The diagram required should be specified by township and range number.

While the following figures may not be absolutely correct, owing to liability to error in a work of such magnitude and to the necessity of making estimates of unsurveyed lands, it is believed that they afford a close approximation to the actual areas. The statement is intended to inform correspondents and the general public as to whether there is much or little public land in the several land districts therein and in particular counties and localities.

In some counties only a few acres are reported as vacant, and in seven all the land has already been taken up. Neither the General Land Office nor the local land officers can furnish information as to the location of such tracts, but such information may be obtained from the records of the local land offices, which, when not in official use, are open to inspection by prospective home seekers or their agents.

Dry Farming.

A regulation has recently been issued increasing the area of a homestead from 160 to 320 acres on land having no water supply, in Los Angeles, Imperial, San Diego, and Riverside counties.

Vacant Public Lands in California, by Counties, Unappropriated and Unreserved, July 1, 1915.

Counties	Land district	Surveyed acres	Unsurveyed acres	Total acres	Brief description of character of land
Alameda	San Francisco	1,120	1,519	2,639	Mountainous.
Alpine	Sacramento	18,760	----------	18,760	Mountainous.
Alpine	Independence	10,581	----------	10,581	Mountainous, grazing, and mineral.
Total Alpine		29,341	----------	29,341	
Amador	Sacramento	13,658	----------	13,658	Mountainous.
Butte	Sacramento	26,790	----------	26,790	Hilly, grazing, mineral, farming.
Calaveras	Sacramento	66,556	----------	66,556	Hilly, grazing, mineral, farming.
Colusa	Sacramento	23,174	1,280	24,454	
Colusa	San Francisco	18,980	----------	18,980	Mountainous.
Total Colusa		42,154	1,280	43,434	
Contra Costa	San Francisco	1,239	----------	1,239	Mountainous.
Del Norte	Eureka	831	----------	831	Sea beach, mountainous, waste.
El Dorado	Sacramento	39,088	----------	39,088	Hilly, grazing, mineral, farming.
Fresno	Sacramento	21,193	2,560	23,753	Hilly, grazing, mineral, farming.
Fresno	San Francisco	45,779	3,862	49,641	Mountainous.
Fresno	Visalia	125,964	11,480	137,444	Mountainous, grazing.
Total Fresno		192,936	17,902	210,838	
Glenn	Sacramento	15,044	----------	15,044	Hilly, grazing, mineral, farming.
Glenn	San Francisco	1,920	----------	1,920	Mountainous.
Total Glenn		16,964	----------	16,964	
Humboldt	Eureka	89,484	18,623	108,107	Mountainous, grazing, farming, timber, mineral.
Imperial	Los Angeles	720,991	212,560	933,551	Level desert.
Inyo	Independence	2,627,160	1,205,823	3,832,983	Agricultural, mountainous, desert.
Kern	Visalia	115,351	24,128	139,479	Mountainous, grazing.
Kern	San Francisco	46,245	----------	46,245	Mountainous.
Kern	Independence	621,397	98,041	719,438	Grazing and mineral.
Kern	Los Angeles	43,277	14,347	57,624	Arid, level desert, and mountainous.
Total Kern		826,270	136,516	----------	
Kings	San Francisco	2,400	----------	2,400	Mountainous.
Kings	Visalia	29,935	----------	29,935	Mountainous, grazing.
Total Kings		32,335	----------	32,335	
Lake	Sacramento	9,720	----------	9,720	Mountainous.
Lake	San Francisco	137,488	10,455	147,943	Mountainous.
Total Lake		147,208	10,455	157,663	
Lassen	Susanville	942,320	81,852	1,024,172	Desert, grazing, mineral.
Los Angeles	Los Angeles	562,788	138,932	701,720	Arid, level desert, and mountainous.
Madera	Sacramento	24,345	----------	24,345	Hilly, grazing, farming, mineral.
Marin	----------	----------	----------	----------	None.
Mariposa	Sacramento	85,642	----------	85,642	Hilly, grazing, farming, mineral.

Vacant Public Lands in California, by Counties, Unappropriated and Unreserved, July 1, 1915—Continued.

Counties	Land district	Surveyed acres	Unsurveyed acres	Total acres	Brief description of character of land
Mendocino	Eureka	8,600	----------	8,600	Mountainous, grazing, timber.
Mendocino	San Francisco	195,759	19,565	215,324	Mountainous.
Total Mendocino	----------	289,359	19,565	308,924	
Merced	Visalia	8,361	----------	8,361	Mountainous, grazing.
Merced	Sacramento	14,962	----------	14,962	Hilly, grazing, farming, mineral.
Merced	San Francisco	15,815	----------	15,815	Mountainous.
Total Merced	----------	39,138	----------	39,138	
Modoc	Susanville	288,400	15,824	304,224	Desert, grazing, mineral.
Modoc	Sacramento	29,892	6,080	35,972	Mountainous, grazing, timber.
Total Modoc	----------	318,292	21,904	340,196	
Mono	Independence	281,458	40,573	322,031	Grazing, mineral, agricultural.
Monterey	San Francisco	215,338	14,760	230,098	Mountainous.
Monterey	Visalia	1,920	----------	1,920	Mountainous, grazing.
Total Monterey	----------	217,258	14,760	232,018	
Napa	Sacramento	26,901	----------	26,901	Mountainous, grazing, timber.
Napa	San Francisco	46,011	----------	46,011	Mountainous.
Total Napa	----------	72,912	----------	72,912	
Nevada	Sacramento	43,661	----------	43,661	Mineral, hilly, grazing, farming.
Orange	Los Angeles	20,101	1,906	22,007	Mountainous, hilly.
Placer	Sacramento	24,805	----------	24,805	Hilly, grazing, mineral.
Plumas	Susanville	11,800	2,366	14,166	Mountainous, grazing, mineral.
Riverside	Los Angeles	1,422,315	417,855	1,840,170	Mountainous, rolling, level desert.
Sacramento	----------	----------	----------	----------	None.
San Benito	San Francisco	175,440	4,035	179,475	Mountainous.
San Benito	Visalia	8,586	----------	8,586	Mountainous, grazing.
Total San Benito	----------	184,026	4,035	188,061	
San Bernardino	Independence	2,253,034	1,106,077	3,359,111	Mountainous, mineral, arid.
San Bernardino	Los Angeles	3,195,792	416,766	3,612,558	Mountainous, rolling, and level desert.
Total San Bernardino	----------	5,448,826	1,522,843	6,971,669	
San Diego	Los Angeles	174,345	333,799	508,144	Mountainous, rolling, and level desert.
San Francisco	----------	----------	----------	----------	None.
San Joaquin	----------	----------	----------	----------	None.
San Luis Obispo	San Francisco	250,455	5,332	255,787	Mountainous.
San Mateo	----------	----------	----------	----------	None.
Santa Barbara	Los Angeles	41,478	6,176	47,654	Mountainous, rolling.
Santa Barbara	San Francisco	47,489	----------	47,489	Mountainous.
Total Santa Barbara	----------	88,967	6,176	95,143	

Vacant Public Lands in California, by Counties, Unappropriated and Unreserved, July 1, 1915—Continued.

Counties	Land district	Surveyed acres	Unsurveyed acres	Total acres	Brief description of character of land
Santa Clara	San Francisco	58,720	4,924	63,644	Mountainous.
Santa Cruz					None.
Shasta	Sacramento	2,204,151	2,160	2,206,311	Farming, grazing, timber, mineral.
Sierra	Susanville	22,200		22,200	Mountainous, grazing, mineral.
Siskiyou	Eureka	933		933	Forest listings.
Siskiyou	Sacramento	168,595	47,232	215,827	Farming, grazing, timber, mineral.
Total Siskiyou		169,528	47,232	216,760	
Solano	San Francisco	1,988		1,988	Mountainous.
Sonoma	San Francisco	43,631	4,361	47,992	Mountainous.
Stanislaus	Sacramento	19,935		19,935	Hilly, grazing, mineral.
Stanislaus	San Francisco	24,979	2,926	27,905	Mountainous.
Total Stanislaus		44,914	2,926	47,840	
Sutter					None.
Tehama	Sacramento	141,700	720	142,420	Hilly, grazing, mineral.
Trinity	Eureka	13,040	2,560	15,600	Mountainous, grazing, mineral, timber.
Trinity	Sacramento	24,314	4,960	29,274	Mountainous, grazing, mineral, timber.
Total Trinity		37,354	7,520	44,874	
Tulare	Visalia	38,000	50,868	88,868	Mountainous, grazing.
Tuolumne	Sacramento	34,600	1,600	36,200	Mineral, grazing, timber.
Ventura	Los Angeles	45,853	53,018	98,871	Mountainous, rolling.
Yolo	Sacramento	39,216		39,216	Hilly, grazing.
Yolo	San Francisco	6,744		6,744	Mountainous.
Total Yolo		45,960		45,960	
Yuba	Sacramento	26,102		26,102	Hilly, grazing, mineral.
Totals		16,244,018	4,391,905	20,635,923	

The following seven counties have no unappropriated or unreserved public land:

Marin,
Sacramento,
San Francisco,
San Joaquin,
San Mateo.
Santa Cruz,
Sutter,

Indian Reservations.

The Indians were prominent in early California history, but their progress towards their present insignificance began far back in the Spanish period. It proceeded much more rapidly after the restraining influence of the Missions was removed, leaving them free to revert to savagery; and the downward progress of the race was fearfully accelerated during the mining period, when they were ambushed, depraved, and in large numbers killed. There have been no Indian wars in California's annals, but many butcheries.

The natives have declined exceedingly in number since 1834. They have always been mild-tempered, low, and unintelligent, and are today a poor and miserable race. They are called "Digger Indians," indiscriminately, although divided by a multiplicity of tongues.

The Indians of California are of at least fourteen different linguistic stocks. The Government, in dealing with the California tribes, did not follow the policy pursued with the wild Indians of the plains, and no treaties were made with them and no remuneration paid for lands acquired by white settlers. Large numbers are located on twenty-six reservations, namely: Hoopa Valley, Round Valley, Tule River, Yuma, and twenty-two Mission reservations.

Most of the Mission Indians are located on small reservations scattered over Riverside and San Diego counties. Among them are found representatives of a number of different tribes.

Round Valley reservation, embracing an area of 59 square miles, is situated in Mendocino County, and the remnants of nine small tribes are located here, who might well be classed as civilized. Tule River reservation in Tulare County contains 76 square miles, and contains the remainder of the once powerful Tule tribe. The Yuma reservation contains an area of 71¾ square miles, the Indians living on this section being the most primitive of the California tribes in manners and customs.

Indians are located in 55 of the 58 counties of the State. The allotments number 2,592, the acreage amounting to 82,162 acres allotted, 430,136 unallotted, or a total of 512,298 acres.

POPULATION OF CALIFORNIA.

The first settlement in California was made by the Spaniards in 1769, when the Franciscan Fathers founded a mission at San Diego. In 1776 the Mission Dolores was established where San Francisco now stands. California was under Spanish rule until 1822, when, at the termination of the Mexican revolution, it declared its allegiance to Mexico. For several years prior to 1846 large numbers of immigrants from the United States had been arriving in California, and in June of that year a revolt against Mexico was begun by the American settlers. In July and August the American flag was raised at Monterey, San Francisco, Sonoma, Sacramento, San Jose, San Diego, Santa Barbara, Los Angeles, and other places.

The end of the war in Mexico took place January, 1847, and in February, 1848, California was ceded to the United States. From 1846 to 1849 California was under military and provisional rule by the United States. In October, 1849, a state constitution was adopted at Monterey, and on September 9, 1850, California became a state of the Union.

Population of California, 1850-1914.

Year	Population	Increase over preceding census	
		Number	Per cent
1850	92,597		
1860	379,994	287,397	310.4
1870	560,247	180,253	47.4
1880	864,694	304,447	54.3
1890	*1,213,398	348,704	40.3
1900	1,485,053	271,655	22.4
1910	2,377,549	892,496	60.1
1914	2,757,895		

*Includes population of Indian reservations (5,268).

During each decade since 1850, the population of California has increased more rapidly than that of continental United States. The population of the State in 1910 was more than twenty-five times as large as in 1850, while the population of the continental United States was a little less than four times that in 1850.

Rank in Population of the Fifty States and Territories.

California ranked twenty-ninth in 1850, twenty-sixth in 1860, twenty-fourth in 1870 and 1880, twenty-second in 1890, twenty-first in 1900, and twelfth in 1910.

The Density of Population per Square Mile.

1850	1860	1870	1880	1890	1900	1910
.6	2.4	3.6	5.5	7.8	9.5	15.3

The density of population in California is low, the average number of persons to the square mile in 1910 being 15.3; in 1900, 9.5, and in 1890, 7.8. The average number per square mile for continental United States in 1910 was 30.9. This compares with 508.8 in Rhode Island, 418.8 in Massachusetts, 337.7 in New Jersey, 191.2 in New York, 342.4 in the United Kingdom, and 213.3 in India. The Australian Commonwealth has only 1.39 to the square mile, New Zealand 7.8, and Canada 1.4; 589 in Belgium, 436 in Holland, 188 in France, and 270 in Germany.

Population of Cities and Places of 2,500 to 25,000 in 1910.

Population of cities of 25,000 and upward (8).	
San Francisco	416,912
Los Angeles	319,198
Oakland	150,174
Sacramento	44,696
Berkeley	40,434
San Diego	39,578
Pasadena	30,291
San Jose	28,946

Cities of 10,000 to 25,000 (13).	
Fresno	24,892
Alameda	23,383
Stockton	23,253
Long Beach	17,809
Riverside	15,212
San Bernardino	12,779
Bakersfield	12,727
Eureka	11,845
Santa Barbara	11,659
Vallejo	11,340
Santa Cruz	11,146
Redlands	10,449
Pomona	10,207

Cities of 2,500 to 6,000 (24).	
Richmond	6,802
Petaluma	5,880
San Luis Obispo	5,157
Alhambra	5,021
Hanford	4,829
Grass Valley	4,520
Palo Alto	4,486
Coalinga	4,199
Colton	3,980
Oroville	3,859
Chico	3,750
Salinas	3,736
Redding	3,572
Corona	3,540
Red Bluff	3,530
San Leandro	3,471
Redondo Beach	2,935
Glendale	2,746
Hayward	2,746
Porterville	2,696
Anaheim	2,628
Emeryville	2,613
Roseville	2,608
Oxnard	2,555

San Francisco, the largest city, has a population of 416,912, and Los Angeles, the second city, a population of 319,198. Oakland, with 150,174 inhabitants, is the only other city in the State having over 100,000 inhabitants. The following eight cities had over 25,000 inhabitants in 1910:

City	Population, 1910	Increase over preceding census	Per cent
Berkeley	40,434	27,220	206.0
Los Angeles	319,198	216,719	211.5
Oakland	150,174	83,214	124.3
Pasadena	30,291	21,174	232.2
Sacramento	44,696	15,414	52.6
San Diego	39,578	21,878	123.6
San Francisco	416,912	74,130	21.6
San Jose	28,946	7,446	34.6

The above figures are for the regular census of 1910; since then the estimated increase in twenty-two cities having a population of 8,000 and upwards on July 1, 1914, is as follows:

City	Population, census June 1, 1900	Population, census April 15, 1910	Estimated population July 1, 1914
Alameda	16,464	23,383	26,330
Bakersfield	*6,127	12,727	15,538
Berkeley	13,214	40,434	52,105
Eureka	7,327	11,845	13,768
Fresno	12,470	24,892	29,809
Long Beach	2,252	17,809	24,437
Los Angeles	†104,266	319,198	438,914
Oakland	66,960	150,174	183,002
Pasadena	9,117	30,291	40,880
Pomona	5,526	10,207	12,202
Redlands	4,797	10,449	12,856
Riverside	7,973	15,212	18,297
Sacramento	29,282	44,696	62,717
San Bernardino	6,150	12,779	15,603
San Diego	17,700	39,578	48,900
San Francisco	342,782	416,912	448,502
San Jose	21,500	28,946	37,086
Santa Ana	4,933	8,429	9,919
Santa Barbara	6,587	11,659	13,818
Santa Cruz	5,659	11,146	13,482
Stockton	17,506	23,253	25,702
Vallejo	7,965	11,340	12,777

†Includes population of San Pedro City, annexed in 1909.

California has 58 counties, the population ranging from 309 in Alpine to 504,131 in Los Angeles County.

Two territorial changes have taken place since 1900: The eastern portion of San Diego County was taken into Imperial County in 1907, and part of Fresno County was annexed to Kings County in 1909.

Ten counties have decreased in population during the decade 1900–1910, the rates of decrease ranging from 5.8 per cent in Mono County, to 39.3 in Alpine County, and a decrease from 125 in Mono County to 2,834 in Nevada County.

San Bernardino County, with 20,157 square miles, has the largest area; San Francisco County, co-extensive with San Francisco city, with 43 square miles and 9,695.6 persons per square mile, has the smallest area and the highest density. Alpine, Inyo, and Mono counties each average less than 1 person per square mile. In 1910 the urban territory of the State, or the cities and incorporated towns of 2,500 or more, contained 61.8 per cent of the total population, while 38.2 per cent lived in rural territory.

The following estimated population of cities and towns on June 30, 1915, is taken from the annual report of the State Controller, and as stated therein is practically correct.

ESTIMATED POPULATIONS, 1915.

The populations of the various cities of the State are based upon estimates. It is not claimed that they are correct, but presumably they are approximately so—at any rate they are as near the mark as the various city clerks or auditors can hit it after careful investigation.

As a matter of fact, the population of the State is not known, although the difference in the totals as ascertained by three methods is not great, 150,000 separating the highest from the lowest, as follows:

School census method	3,004,000
Registered vote method	2,878,470
United States census method	2,854,727

On the basis of the percentage of increase according to the census bureau's method, the rural population of the State should be 837,781. The cities claim 2,450,181. The two figures give a total of 3,287,962, which exceeds the highest estimate by any of three methods indicated. It appears safe to assume that the cities in arriving at their estimates were a little too enthusiastic. Either of the figures under the three million estimate is likely to be practically correct.*

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*Includes population of Kern County, annexed in 1909.

Estimated Population of Cities and Towns in California on June 30, 1915.*

City	Population per 1910 census	Estimated population June 30, 1915
Alameda	23,383	30,000
Albany	808	1,900
Alhambra	5,021	9,000
Alturas	916	1,500
Alviso	402	550
Amador	1,009	1,100
Anaheim	2,628	4,178
Angels	----------	2,500
Antioch	1,124	2,000
Arcadia	696	1,050
Arcata	1,121	1,600
Arroyo Grande	----------	1,200
Auburn	2,376	2,366
Avalon	----------	750
Azusa	1,477	2,000
Bakersfield	12,727	19,220
Banning	----------	1,500
Beaumont	----------	750
Belvedere	481	550
Benicia	2,360	2,400
Berkeley	40,434	60,000
Beverly Hills	----------	590
Biggs	403	500
Bishop	1,190	1,750
Blue Lake	507	614
Brawley	881	3,000
Burbank	----------	2,000
Burlingame	1,565	3,750
Calexico	797	3,000
Calistoga	751	900
Chico	3,750	6,200
Chino	1,444	2,200
Chula Vista	----------	2,000
Claremont	1,114	1,500
Cloverdale	823	1,100
Clovis	1,000	1,500
Coalinga	4,199	2,500
Colfax	621	1,050
Colusa	1,582	2,000
Colton	3,980	5,500
Compton	922	1,500
Concord	703	750
Coram	666	150
Corcoran	----------	700
Corning	972	2,100
Corona	3,540	5,000
Coronado	1,477	3,600
Covina	1,652	2,500
Crescent City	1,114	1,200
Daly City	----------	5,000
Delano	----------	575
Dinuba	970	1,900
Dixon	827	1,200
Dorris	214	420
Dunsmuir	1,719	2,200
Eagle Rock	1,000	1,800
East San Diego	----------	4,500
El Cajon	----------	600
El Centro	1,610	6,000
El Monte	----------	1,200
El Paso de Robles	1,441	1,800
Elsinore	488	700
Emeryville	2,613	2,950
Escondido	1,334	2,000

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*From the Report of the State Controller, 1916.

Estimated Population of Cities and Towns in California on June 30, 1915—Continued.

City	Population per 1910 census	Estimated population June 30, 1915
Etna	518	518
Eureka	11,845	15,000
Exeter	------------	2,000
Fairfield	834	1,000
Ferndale	905	1,000
Fillmore	------------	1,700
Firebaugh	450	600
Fort Bragg	2,408	3,000
Fort Jones	316	500
Fortuna	883	1,150
Fowler	675	1,250
Fresno	24,892	45,000
Fullerton	1,725	3,300
Gilroy	2,437	2,900
Glendale	2,746	7,556
Glendora	1,000	2,200
Grass Valley	4,520	5,100
Gridley	987	1,800
Hanford	4,829	6,250
Hayward	2,746	4,000
Healdsburg	2,011	3,000
Hemet	992	1,800
Hercules	279	380
Hermosa Beach	679	2,000
Hillsborough	------------	900
Hollister	2,308	2,500
Holtville	729	2,000
Huntington Beach	815	2,500
Huntington Park	1,299	3,500
Imperial	1,257	3,000
Inglewood	1,536	3,500
Jackson	2,035	2,500
Kennett	1,714	1,500
King	------------	1,050
Kingsburg	634	1,325
La Mesa	1,200	1,400
Lakeport	870	1,100
Larkspur	594	2,000
Lemoore	1,000	2,000
Lincoln	1,402	1,500
Lindsay	1,814	2,500
Livermore	2,030	2,450
Lodi	2,697	4,200
Lompoc	1,482	1,650
Long Beach	17,809	32,252
Lordsburg	954	1.650
Los Angeles	319,198	550,000
Los Banos	745	1,000
Los Gatos	2,232	2,250
Loyalton	983	600
McKittrick	1,500	500
Madera	2,404	3,300
Manhattan Beach	------------	1,500
Maricopa	------------	1,750
Martinez	2,115	3,000
Marysville	5,430	6.000
Mayfield	1,041	1,080
Merced	3,102	4,000
Mill Valley	2,551	3,000
Modesto	4,034	7,200
Monrovia	3,576	5,500
Montague	274	450
Monterey	4,923	5,000
Morgan Hill	607	660

Estimated Population of Cities and Towns in California on June 30, 1915—Continued.

City	Population per 1910 census	Estimated population June 30, 1915
Mountain View	1,161	1,400
Napa	5,791	6,500
National City	1,733	3,400
Needles	----------	3,500
Nevada City	2,689	3,000
Newman	892	1,100
Newport Beach	445	1,500
Oakdale	1,035	1,500
Oakland	150,174	185,000
Oceanside	673	1,100
Ontario	4,274	7,000
Orange	2,920	4,500
Orland	836	1,300
Oroville	3,859	3,300
Oxnard	2,555	3,500
Pacific Grove	2,384	2,500
Palo Alto	4,486	6,000
Pasadena	30,291	39,000
Perris	1,441	900
Petaluma	5,880	7,500
Piedmont	1,719	3,200
Pinole	798	1,500
Pittsburg	2,372	4,000
Placerville	1,914	2,150
Pleasanton	1,254	1,300
Point Arena	497	500
Pomona	10,207	14,500
Porterville	2,696	4,000
Potter Valley	576	830
Red Bluff	3,530	5,072
Redding	3,572	4,800
Redlands	10,449	11,500
Redondo Beach	2,935	4,750
Redwood City	2,442	3,500
Reedley	1,386	2,200
Rialto	1,000	1,300
Richmond	6,802	16,000
Rio Vista	884	1,000
Riverside	15,212	19,000
Rocklin	1,026	1,000
Roseville	2,608	4,500
Ross	556	875
Sanger	----------	2,600
Sacramento	44,696	75,000
Salinas	3,736	5,000
San Anselmo	1,531	3,500
San Bernardino	12,779	18,000
San Buenaventura	2,945	3,500
San Bruno	----------	1,500
San Diego	39,578	90,000
San Fernando	----------	2,400
San Francisco	416,912	530,000
San Gabriel	----------	1,700
San Jacinto	898	1,250
San Jose	28,946	34,000
San Juan	326	550
San Leandro	3,471	4,500
San Luis Obispo	5,157	6,500
San Marino	----------	550
San Mateo	4,384	6,000
San Rafael	5,934	6,000
Santa Ana	8,429	14,500
Santa Barbara	11,659	15,000
Santa Clara	4,348	6,000

Estimated Population of Cities and Towns in California on June 30, 1915—Continued.

City	Population per 1910 census	Estimated population June 30, 1915
Santa Cruz	11,146	13,600
Santa Maria	2,260	2,750
Santa Monica	7,847	12,000
Santa Paula	2,216	3,100
Santa Rosa	7,817	11,000
Sausalito	2,383	2,500
Sawtelle	2,143	4,500
Sebastopol	1,233	1,900
Selma	1,750	2,500
Sierra Madre	1,303	1,750
Sisson	636	500
Sonoma	957	1,280
Sonora	2,029	2,029
South Pasadena	4,649	7,500
South San Francisco	1,989	3,500
St. Helena	1,603	1,800
Stanton		575
Stockton	23,253	42,000
Suisun	641	800
Sunnyvale		1,650
Susanville	688	1,000
Sutter Creek		1,300
Taft		3,500
Tehachapi	385	500
Tehama	221	300
Tropico		3,000
Tracy	1,129	2,500
Tulare	2,758	3,200
Turlock	1,573	3,200
Ukiah	2,136	2,600
Upland	2,384	3,000
Vacaville	1,177	1,250
Vallejo	11,340	15,000
Venice	3,219	8,500
Vernon	772	1,350
Visalia	4,550	6,000
Walnut Creek	450	600
Watsonville	4,446	6,000
Watts	1,922	3,500
Wheatland	481	500
Whittier	4,550	7,536
Willits	1,153	2,300
Willows	1,139	3,000
Winters	910	1,200
Woodland	3,187	5,000
Yreka	1,134	1,500
Yuba City	1,160	1,700
Totals	1,634,805	2,450,181

TABLE I.

Population in California by Counties, 1850-1910.

Counties	1850	1860	1870	1880	1890	1900	1910
Alameda	---------	8,927	24,237	62,976	93,864	130,197	246,131
Alpine	---------	---------	685	539	667	509	309
Amador	---------	10,930	9,582	11,384	10,320	11,116	9,086
Butte	3.574	12,106	11,403	18,721	17,939	17,117	27,301
Calaveras	16,884	16,299	8,895	9,094	8,882	11,200	9,171
Colusa[1]	115	2,274	6,165	13,118	14,640	7,364	7,732
Contra Costa[2]	---------	5,328	8,461	12,525	13,515	18,046	31,674
Del Norte[3]	---------	1,993	2,022	2,584	2,592	2,408	2,417
El Dorado	20,057	20,562	10,309	10,683	9,232	8,986	7,492
Fresno[4]	---------	4,605	6,336	9,478	32,026	37,862	75,657
Glenn[1]	---------	---------	---------	---------	---------	5,150	7,172
Humboldt[5]	---------	2,694	6,140	15,512	23,469	27,104	33,857
Imperial[11]	---------	---------	---------	---------	---------	---------	13,591
Inyo	---------	---------	1,956	2,928	3,544	4,377	6,974
Kern	---------	---------	2,925	5,601	9,808	16,480	37,715
Kings[6]	---------	---------	---------	---------	---------	9,871	16,230
Klamath[7]	---------	1,803	1,686	---------	---------	---------	---------
Lake	---------	---------	2,969	6,596	7,101	6,017	5,526
Lassen	---------	---------	1,327	3,340	4,239	4,511	4,802
Los Angeles[8]	3,530	11,333	15,309	33,381	101,454	170,298	504,131
Madera[4]	---------	---------	---------	---------	---------	6,364	8,368
Marin	323	3,334	6,903	11,324	13,072	15,702	25,114
Mariposa	4,379	6,243	4,572	4,339	3,787	4,720	3,956
Mendocino	55	3,967	7,545	12,800	17,612	20,465	23,929
Merced	---------	1,141	2,807	5,656	8,085	9,215	15,148
Modoc	---------	---------	---------	4,399	4,986	5,076	6,191
Mono	---------	---------	430	7,499	2,002	2,167	2,042
Monterey	1,872	4,739	9,876	11,302	18,637	19,380	24,146
Napa	405	5,521	7,163	13,235	16,411	16,451	19,800
Nevada	---------	16,446	19,134	20,823	17,369	17,789	14,955
Orange[8]	---------	---------	---------	---------	13,589	19,696	34,436
Placer	---------	13,270	11,357	14,232	15,101	15,786	18,237
Plumas	---------	4,363	4,489	6,180	4,933	4,657	5,259
Riverside[9]	---------	---------	---------	---------	---------	17,897	34,696
Sacramento	9,087	24,142	26,830	34,390	40,339	45,915	67,806
San Benito	---------	---------	---------	5,584	6,412	6,633	8,041
San Bernardino[9]	---------	5,551	3,988	7,786	25,497	27,929	56,706
San Diego[9]	798	4,324	4,951	8,618	34,987	35,090	61,665
San Francisco[2]	---------	56,802	149,473	233,959	298,997	342,782	416,912
San Joaquin	3,647	9,435	21,050	24,349	28,629	35,452	50,731
San Luis Obispo	336	1,782	4,772	9,142	16,072	16,637	19,383
San Mateo	---------	3,214	6,635	8,669	10,087	12,094	26,585
Santa Barbara	1,185	3,543	7,784	9,513	15,754	18,934	27,738
Santa Clara[2]	---------	11,912	26,246	35,039	48,005	60,216	83,539
Santa Cruz	643	4,944	8,743	12,802	19,270	21,512	26,140
Shasta	378	4,360	4,173	9,492	12,133	17,318	18,920
Sierra	---------	11,387	5,619	6,623	5,051	4,017	4,098
Siskiyou[10]	---------	7,629	6.848	8,610	12,163	16,962	18,801
Solano	580	7,169	16,871	18,475	20,946	24,143	27,599
Sonoma	560	11,867	19,819	25,926	32,721	38,480	48,394
Stanislaus	---------	2,245	6,499	8,751	10,040	9,550	22,522
Sutter	3,444	3,390	5,030	5,159	5,469	5,886	6,328
Tehama	---------	4,044	3,587	9,301	9,916	10,996	11,401
Trinity	1,635	5,125	3,213	4,999	3,719	4,383	3,301
Tulare[6]	---------	4,638	4,533	11,281	24,574	18,375	35,440
Tuolumne	8,351	16,229	8,150	7,848	6,082	11,166	9,979
Ventura	---------	---------	---------	5,073	10,071	14,367	18,347
Yolo	1,086	4,716	9,899	11,772	12,684	13,618	13,926
Yuba	9,673	13,668	10,851	11,284	9,636	8,620	10,042
Totals	92,597	379,994	560,247	864,694	1,208,130	1,485,053	2,377,549

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[1] Glenn organized from part of Colusa in 1892. [2] The returns for 1850 for Contra Costa and Santa Clara were lost, and those for San Francisco were destroyed by fire. [3] Part annexed to Siskiyou between 1880 and 1890. [4] Madera organized from part of Fresno in 1893, and another part of Fresno County annexed to Kings in 1909. [5] Part of Klamath annexed in 1874. [6] Kings organized from part of Tulare in 1893, enlarged by annexation of part of Fresno County in 1909. [7] Annexed to Humboldt and Siskiyou in 1874. [8] Orange organized from part of Los Angeles in 1889. [9] Riverside organized from part of San Bernardino and San Diego in 1893. [10] Part of Klamath annexed in 1874, and part of Del Norte annexed between 1880 and 1890. [11] Organized from part of San Diego County in 1907.

TABLE II.

White and Colored Population by Counties, 1900.

Counties	Population, 1900				
	White	Negro	Indian	Chinese	Japanese
Alameda	125,432	1,334	71	2,211	1,149
Alpine	359	3	142	5	
Amador	10,805	28	130	153	
Butte	15,733	106	201	712	365
Calaveras	10,879	69	100	148	4
Colusa	6,840	76	121	274	53
Contra Costa	17,088	47	8	627	276
Del Norte	2,138	1	269		
El Dorado	8,513	99	138	206	30
Fresno	34,570	399	520	1,775	598
Glenn	4,867	18	24	227	14
Humboldt	25,359	12	1,728	5	
Imperial					
Inyo	3,355	15	940	67	
Kern	14,974	208	344	906	48
Kings	9,171	76	51	417	156
Lake	5,492	12	428	82	3
Lassen	4,099	1	381	28	2
Los Angeles	163,975	2,841	69	3,209	204
Madera	5,664	51	401	229	19
Marin	14,999	137	25	489	52
Mariposa	4,410	35	173	102	
Mendocino	18,833	38	1,353	218	23
Merced	8,780	31	4	357	43
Modoc	4,560	7	503	6	
Mono	1,656	1	389	120	1
Monterey	17,707	80	26	857	710
Napa	15,857	29	18	541	6
Nevada	17,024	70	48	632	15
Orange	19,459	98		136	3
Placer	14,494	35	74	1,050	133
Plumas	4,018	3	444	192	
Riverside	16,421	254	809	316	97
Sacramento	40,917	511	24	3,254	1,209
San Benito	6,456	57	36	69	15
San Bernardino	26,605	216	572	388	148
San Diego	32,048	406	2,197	414	25
San Francisco	325,378	1,654	15	13,954	1,781
San Joaquin	32,941	322	1	1,875	313
San Luis Obispo	16,389	77	1	154	16
San Mateo	11,652	89	1	306	46
Santa Barbara	18,256	33	72	459	114
Santa Clara	57,934	251	9	1,738	284
Santa Cruz	20,515	81	67	614	235
Shasta	16,131	203	862	102	20
Sierra	3,669	7	31	309	1
Siskiyou	15,646	38	480	790	8
Solano	22,267	101	2	903	870
Sonoma	37,385	32	316	599	148
Stanislaus	9,223	61	25	236	5
Sutter	5,451	34	20	226	155
Tehama	9,878	147	99	729	143
Trinity	3,803	9	234	336	1
Tulare	17,709	73	175	370	48
Tuolumne	10,804	53	149	158	2
Ventura	13,826	34	5	408	94
Yolo	12,662	172	28	346	410
Yuba	7,651	170	24	719	56
Totals	1,402,727	11,045	15,377	45,753	10,151

TABLE III.

White and Colored Population by Counties, 1910.

Counties	White	Negro	Indian	Chinese	Japanese	Total*
Alameda	234,520	3,634	41	4,588	3,266	246,131
Alpine	213		94	1	1	309
Amador	8,838	2	143	101	2	9,086
Butte	25,684	122	298	572	295	27,301
Calaveras	8,941	17	161	49	3	9,171
Colusa	7,155	50	169	218	140	7,732
Contra Costa	29,911	67	3	550	1,009	31,674
Del Norte	2,078	1	337	1		2,417
El Dorado	7,198	28	177	58	31	7,492
Fresno	71,215	474	313	1,377	2,233	75,657
Glenn	6,915	15	32	129	33	7,172
Humboldt	32,153	40	1,652	6	6	33,857
Imperial	12,582	65	682	32	217	13,591
Inyo	6,020	21	792	100	41	6,974
Kern	36,007	369	220	841	273	37,715
Kings	15,366	172	32	358	293	16,230
Lake	5,055	11	433	24	3	5,526
Lassen	4,372	1	410	13	6	4,802
Los Angeles	483,478	9,424	97	2,602	8,461	504,131
Madera	7,650	56	419	211	32	8,368
Marin	24,186	145	26	555	199	25,114
Mariposa	3,674	18	192	69	3	3,956
Mendocino	22,310	31	1,170	263	77	23,929
Merced	14,697	75		278	98	15,148
Modoc	5,629	4	546	11	1	6,191
Mono	1,621		386	21	14	2,042
Monterey	22,135	107	29	575	1,121	24,146
Napa	19,437	48	6	205	103	19,800
Nevada	14,558	14	52	309	22	14,955
Orange	33,589	97	21	83	641	34,436
Placer	16,572	55	102	612	862	18,237
Plumas	4,629	5	380	105	20	5,259
Riverside	31,613	518	1,590	187	765	34,696
Sacramento	61,040	631	62	2,143	3,874	67,806
San Benito	7,643	26		66	286	8,041
San Bernardino	54,153	642	573	284	946	56,706
San Diego	58,514	684	1,516	430	520	61,665
San Francisco	400,014	1,642	46	10,582	4,518	416,912
San Joaquin	46,339	307	8	1,968	1,804	50,731
San Luis Obispo	18,693	77	14	165	434	19,383
San Mateo	25,821	67	1	309	358	26,585
Santa Barbara	26,282	108	45	440	863	27,738
Santa Clara	79,849	262	16	1,064	2,299	83,539
Santa Cruz	25,159	83	15	194	689	26,140
Shasta	17,873	159	756	88	42	18,920
Sierra	3,910		54	117	17	4,098
Siskiyou	17,413	29	1,109	226	24	18,801
Solano	25,432	250	1	811	894	27,559
Sonoma	47,167	43	340	287	554	48,394
Stanislaus	22,129	89	30	161	113	22,522
Sutter	6,012	10	18	79	134	6,328
Tehama	10,809	91	94	309	98	11,401
Trinity	2,903	8	227	163		3,301
Tulare	34,159	190	204	257	615	35,440
Tuolumne	9,698	14	186	75	6	9,979
Ventura	17,132	64	3	235	872	18,347
Yolo	12,618	280	32	198	789	13,926
Yuba	8,909	203	16	493	336	10,042
Totals	2,259,672	21,645	16,371	36,248	41,356	2,377,549

*Not including 1,948 Hindus, 304 Koreans, and 5 Filipinos.

TABLE IV.

Foreign-Born Population in California, 1860-1900.

Country of birth	1860	1870	1880	1890	1900
Africa	12	48	86	139	168
Asia[1]	346	56	16	164	235
Atlantic islands	121	943	3,356	2,587	3,515
Australia	896	1,593	2,350	1,905	2,269
Austria	727	1,078	1,948	3,687	5,356
Belgium	299	291	1,092	663	785
Bohemia	----------	90	239	243	504
Canada	5,437	10,660	18,889	26,028	29,818
Central America	100	124	188	309	481
China	34,935	48,790	73,548	71,066	40,262
Cuba	----------	45	182	----------	93
Denmark	1,328	1,837	3,748	7,764	9,040
England	12,227	17,774	24,722	35,503	35,746
Europe[2]	33	56	109	194	59
Finland	----------	----------	----------	----------	2,763
France	8,462	8,068	9,550	11,855	12,256
Germany	20,919	29,701	42,532	61,472	72,449
Greece	93	97	170	259	372
Holland	439	452	694	760	1,015
Hungary	----------	102	216	369	799
India	----------	63	155	202	263
Ireland	33,147	54,421	62,962	63,138	44,476
Italy	2,987	4,660	7,537	15,495	22,777
Japan	----------	32	133	1,224	10,264
Luxemburg	----------	11	97	24	42
Mexico	9,150	9,339	8,648	7,164	8,086
Norway	715	1,000	1,765	3,702	5,060
Pacific Islands[3]	334	93	173	1,296	1,089
Poland	730	804	1,026	914	1,320
Portugal	1,459	2,508	4,705	9,859	12,068
Roumania	----------	----------	----------	----------	73
Russia	260	540	1,013	3,140	3,421
Scotland	3,670	4,949	6,465	9,299	9,467
South America	2,250	1,940	1,797	1,366	1,137
Spain	470	405	572	836	896
Sweden	1,405	1,944	4,209	10,923	14,549
Switzerland	1,714	2,927	5,308	9,743	10,974
Turkey	13	17	36	202	649
Wales	1,262	1,517	1,920	1,860	1,949
West Indies[4]	304	349	528	670	372
Other countries	181	289	20	8	260
Born at sea	----------	142	170	277	358
Totals	146,528	209,831	292,874	366,309	[5]367,240

[1] Except China, Japan, and India. [2] Not otherwise specified. [3] Except Philippine Islands. [4] Except Cuba and Porto Rico. [5] Of this number (367,240) 123,725 were English speaking from United Kingdom, Australia, and Canada.

TABLE V.

Foreign-Born White Population in California in 1910.

Country*	White population of foreign birth or foreign parentage			
	Foreign born	Native, both parents foreign born	Native, one parent foreign born	Total
Atlantic islands	2,860	2,830	973	6,663
Austria	17,163	5,576	2,839	25,578
British:				
England	48,667	26,096	40,725	115,488
Ireland	52,475	69,988	37,216	159,679
Scotland	13,694	7,443	11,021	32,158
Wales	2,415	1,961	2,559	6,935
Australia	3,296	207	2,064	5,567
Canada—French	3,109	1,755	3,202	8,066
Canada—other	41,445	11,921	35,553	88,919
Total British	165,101	119,371	132,340	416,812
Denmark	14,208	8,244	4,043	26,495
Finland	6,156	2,535	301	8,992
France	17,390	8,836	6,387	32,613
Germany	76,305	85,362	44,715	206,382
Greece	7,918	269	211	8,398
Holland	2,304	1,078	1,035	4,417
Hungary	3,301	985	366	4,652
Italy	63,601	32,651	6,366	102,618
Mexico	33,444	10,787	6,806	51,037
Norway	9,952	4,666	2,528	17,146
Portugal	22,427	21,794	7,398	51,619
Russia	16,607	8,946	1,633	27,186
Spain	4,218	1,180	1,045	6,443
Sweden	26,210	14,797	5,464	46,471
Switzerland	14,520	8,861	4,632	28,018
Turkey	4,521	1,679	132	6,332
All other	9,044	†62,917	3,306	†75,267
Totals	517,250	403,364	232,525	1,153,139

*Foreign country in which born; or if native, in which parents were born.

†Exclusive of 161 whites and 5,107 Indians not distributed by state of birth.

NOTE.—The number of British born have increased in ten years from 123,725 to 416,812, an increase of 293,087.

COMPARATIVE SUMMARY.

Color, Nativity, and Parentage, 1890-1910.

Race	1890	1900	1910
White	1,111,833	1,402,727	2,259,672
Negro	11,322	11,045	21,645
Indian	16.624	15,377	16,371
Chinese	72,472	45,753	36,248
Japanese	1,147	10,151	41,356
All other*			2,257
Totals	1,213,398	1,485,053	2,377,549
Total native	847,089	1,117,813	1,791,117
Total foreign born	366,309	367,240	586,432
Total native white	818,280	1,086,222	1,742,422
Native parentage	497,890	644,428	1,106,533
Foreign parentage	217,979	282,830	403,364
Mixed parentage	102,411	158,964	232,525
Foreign-born white	293,553	316,505	517,250

*Includes 1,948 Hindus, 304 Koreans, and 5 Filipinos.

TABLE VI.

Japanese Farmers in 1912.

(Compiled from the Report of the Bureau of Labor Statistics.)

Counties	Owners		Total assessed value	Number of town lots	Total assessed value	Farm land leases	
	Number of farms	Acres				Number	Acreage*
Alameda	6	47	$63,200	36	$49,300	4	96
Alpine							
Amador							
Butte							
Calaveras							
Colusa							
Contra Costa	2	31	12,380	3	21,050	1	284
Del Norte							
El Dorado							
Fresno	31	4,776	229,020	61	75,695	11	45
Glenn				3	1,750		
Humboldt							
Imperial						7	848
Inyo							
Kern	5	100	1,170	4	2,565		
Kings	13	577	16,320	4	2,175		
Lake							
Lassen							
Los Angeles	27	459	33,800	23	3,560	60	2,418
Madera	4	100	3,600				
Marin							
Mariposa							
Mendocino							
Merced	14	1,049	42,095	2	1,785		
Modoc							
Mono				1	150		
Monterey	2	8	1,280	18	1,050	15	1,741
Napa	1	160	2,300			1	
Nevada	1	320	820	1	1,200		
Orange	5	41	4,190			7	292
Placer	26	732	20,335	4	1,825	23	1,007
Plumas							
Riverside	2	18	1,375	2	600	1	40
Sacramento	17	444	23,290	19	44,200	87	4,682
San Benito	3	60	2,050			5	280
San Bernardino	12	150	11,810	2	285		
San Diego						1	10
San Francisco				5	5,470		
San Joaquin	12	652	24,845	3	1,000	18	1,787
San Luis Obispo							
San Mateo	1	5	1,000	7	3,500	1	3
Santa Barbara						7	327
Santa Clara	4	90	15,365	1	4,750	35	904
Santa Cruz	3	330	9,065	4	3,635	6	220
Shasta	1	82	555				
Sierra				1	300		
Siskiyou							
Solano	11	814	23,230	2	550	5	565
Sonoma	2	66	5,900	3	3,600	1	
Stanislaus	2	40	1,625			1	180
Sutter	1	16	680			2	452
Tehama							
Trinity							
Tulare	15	1,053	47,525	2	2,150	2	60
Tuolumne							
Ventura	2	24	670	6	2,830	2	77
Yolo	5	320	8,830			11	1,278
Yuba	1	162	1,280	1	700		
Totals	331	12,726	$609,605	218	$235,675	282	17,596

*In 32 instances the acreage was not reported. Leases recorded from November 1, 1909, to December 1, 1912.

NOTE.—These figures show only the leases recorded in the offices of the various recorders, and do not represent all the land leased to Japanese, as most of the share leases are not recorded.

JAPANESE STATISTICS.

In March, 1912, the Japanese owned 331 farms, containing 12,726 acres, the assessed value of the land being $478,990, the improvements $130,615, or a total of $609,605.

The number of town lots held by Japanese was 218, the assessed value $136,955, and the improvements $98,720, or a total of $235,675.

The information gathered in accordance with an act of the legislature (chapter 134, of 1909) shows that there were 2,548 business establishments, the capital invested in most cases being very small, 68.7 per cent of the total having a capital of less than $1,000. The total aggregate capital invested, exclusive of that represented by banks, was $4,075,226. The total annual business transacted by these establishments amounted to $16,114,407, of which about 37 per cent was carried on with white persons. The total annual rent paid by these Japanese business houses was over $900,000.

Comparative Summary.

	1909	1912	
Owners:			
Acreage	10,791	12,726	+ 1,935
Total assessed value	$397,298	$609,605	+ $212,307
Number of town lots	------------	218	
Total assessed value	$174,694	$235,675	+ $60,981
Leases:			
Number	319	282	
Acreage	20,294	17,596	

Color and Nativity. Of the total population of California, 1,106,533, or 46.5 per cent, are native whites of native parentage; 635,889, or 26.8 per cent, are native whites of foreign or mixed parentage, and 517,250, or 21.8 per cent, are foreign-born whites. The corresponding percentages in 1900 were 43.4, 29.7, and 21.3, respectively, the proportion of native whites of native parentage increasing somewhat during the decade. In 1910 Japanese constituted 1.7 per cent of the population; Chinese, 1.5; negroes, 0.9; and Indians, 0.7. In 8 of the 58 counties the foreign-born whites represent as much as one-fourth of the population, the percentage being highest (32) in San Mateo. The proportion of native whites of foreign or mixed parentage exceeds one-fourth in 24 counties and is highest in San Francisco County (36.9 per cent).

Dwellings and Families. The total number of dwellings in California is 513,481, and the total number of families 563,636, there being 109.8 families to each 100 dwellings. The average number of persons per dwelling is 4.6, and the average number per family, 4.2.

TABLE VII.

Color and Nativity of Farmers in 1910.

Counties	Native white	Foreign-born white	Negro and other non-white	Total number of farmers
Alameda	866	1,490	66	2,422
Alpine	24	16	2	42
Amador	387	145	5	537
Butte	1,204	274	22	1,500
Calaveras	420	207	5	632
Colusa	547	112	8	667
Contra Costa	712	715	38	1,465
Del Norte	62	46	6	114
El Dorado	551	150	15	716
Fresno	3,968	2,033	244	6,245
Glenn	502	160	1	663
Humboldt	856	614	64	1,534
Imperial	1,077	143	102	1,322
Inyo	313	98	27	438
Kern	818	298	51	1,167
Kings	1,312	475	50	1,837
Lake	478	122	3	603
Lassen	412	77	13	502
Los Angeles	5,682	1,613	624	7,919
Madera	419	131	23	573
Marin	138	360	--------	498
Mariposa	253	63	14	330
Mendocino	966	363	27	1,356
Merced	1,054	780	22	1,856
Modoc	639	80	17	736
Mono	44	42	5	91
Monterey	933	676	49	1,658
Napa	1,006	527	4	1,537
Nevada	349	184	11	544
Orange	2,362	718	85	3,165
Placer	619	263	180	1,062
Plumas	155	63	3	221
Riverside	2,044	517	127	2,688
Sacramento	885	485	231	1,601
San Benito	616	289	16	921
San Bernardino	2,365	567	17	2,949
San Diego	1,591	586	121	2,298
San Francisco	30	118	9	157
San Joaquin	2,179	977	130	3,286
San Luis Obispo	929	767	18	1,714
San Mateo	258	390	17	665
Santa Barbara	874	448	33	1,355
Santa Clara	2,725	1,860	146	4,731
Santa Cruz	851	588	27	1,466
Shasta	825	151	34	1,010
Sierra	77	32	1	110
Siskiyou	852	218	44	1,114
Solano	620	449	74	1,143
Sonoma	2,737	2,012	23	4,772
Stanislaus	1,879	801	7	2,687
Sutter	696	154	23	873
Tehama	799	188	19	1,006
Trinity	235	55	18	308
Tulare	3,253	707	61	4,021
Tuolumne	241	143	2	386
Ventura	965	307	21	1,293
Yolo	934	255	66	1,255
Yuba	338	91	7	436
Totals	58,926	26,193	3,078	88,197

PART II.

AGRICULTURE.

FARMS AND FARMERS.

Number and Value of Farms, Size of Farms, Mortgage Debt on Farms, Improved and Unimproved Farm Land. Irrigation.

DOMESTIC ANIMALS.

Horses, Cattle, Sheep, Swine, 1875-1915; Domestic Animals by Counties; Poultry, Dairy Products; Bees, Honey and Wax; Wool and Mohair.

California ranks second in land area and twelfth in population among the states of continental United States. The soils vary from heavy clay like ''adobe'' soils to sandy and gravelly loams.

Over one-fourth (28 per cent) of the land area of the State is in farms. The average value of farm land per acre for the State as a whole is $47.16. Between 1900 and 1910 there was an increase of 21.6 per cent in the number of farms as compared with an increase of 60.1 per cent in the population.

During the same period farm property, which includes land, buildings, implements and machinery, and live stock (domestic animals, poultry and bees), increased in value $818,167,000, or 102.7 per cent.

The average value of a fully equipped farm is $18,308, an increase of $7,328 as compared with the average in 1900. The average value per acre of land alone rose from $21.87 in 1900 to $47.16 in 1910.

There are 58,926 native white farmers in the State; 26,193 foreign born, white, and 3,078 negro and other non-whites, or a total of 88,197.

In addition to 11,389,894 acres of improved land in farms, there is 4,541,767 acres of woodland, and 11,999,783 acres of other unimproved lands in farms, or a total of 27,931,444 acres.

Number, Area, and Value of Farms in 1900 and 1910.

	1900	1910	Increased per cent
Population	1,485,053	2,377,549	60.1
Number of farms	72,542	88,197	21.6
Land area of State, acres	99,898,880	*99,617,280	----------
Land in farms, acres	28,828,951	27,931,444	†3.1
Improved land in farms, acres	11,958,837	11,389,894	†4.8
Average acre per farm	397.4	316.7	†20.3
Total value of farm property	$796,527,955	$1,614,694,584	102.7
Land	630,444,960	1,317,195,448	108.9
Buildings	77,468,000	133,406,040	72.2
Implements and machinery	21,311,670	36,493,158	71.2
Domestic animals, poultry and bees	67,303,325	127,599,938	89.6
Average value of all property per farm	$10,980.00	$18,308.00	66.7
Average value of land per acre	21.87	47.16	115.6

*Due to the formation of the Salton Sea.

†Decreased. This apparent falling off is due in part to errors in the tabulation in the census of 1900, when certain tracts included in forest reserves in 1910 were included in farm land in 1900.

Summary of Populations and Farms, 1850-1910.

Year	Population	Number of farms	Land in farms		Per cent of land area in farms
			All land	Improved	
1850	92,597	872	3,893,985	32,454	3.9
1860	379,994	18,716	8,730,034	2,468,034	8.8
1870	560,247	23,724	11,427,105	6,218,133	11.5
1880	864,694	35,934	16,593,742	10,669,698	16.7
1890	1,213,398	52,894	21,427,293	12,222,839	21.5
1900	1,485,053	72,542	28,828,951	11,958,837	28.9
1910	2,377,549	88,197	27,931,444	11,389,894	28.0

Value of Farm Property.

The total wealth in the form of farm property is $1,614,695,000, of which 89.8 per cent is contributed by land and buildings, 7.9 per cent by live stock, and 2.3 per cent by implements and machinery. The value of land and buildings is $1,450,601,000, being a little more than double that for 1900. In 1850 the value was only $3,874,000.

The value of the different classes of farm property in 1910 was as follows:

Farm property	Value
Land	$1,317,195,448
Buildings	133,406,040
Implements and machinery	36,493,158
Domestic animals	123,024,652
Poultry	3,844,526
Bees	729,793
Total	$1,614,694,584

Summary of Values, 1850-1910.

Year	Total value	Land and buildings	Implements and machinery	Domestic animals, poultry, and bees
1850	$7,328,582	$3,874,041	$103,483	$3,351,058
1860	86,870,327	48,726,804	2,558,506	35,585,017
1870	184,521,470	141,240,028	5,316,690	37,964,752
1880	*311,997,443	262,051,282	8,447,744	*41,498,417
1890	*777,381,767	697,116,630	14,689,710	*65,575,427
1900	796,527,955	707,912,960	21,311,670	67,303,325
1910	1,614,694,584	1,450,601,488	36,493,158	127,599,938

*Includes estimated value of range animals.

Size of Farms.

In California there is a great area of semiarid land utilized for grazing purposes only or left unutilized. Upon such lands are located many very large farms or ranches, and these explain the high average acreage per farm. Farms other than those used almost exclusively for grazing are not on the average unusually large, as compared with the average in other states. The average size of the California farm is 316.7 acres, compared with 4,465.6 in 1850; 466.4 in 1860; 481.7 in 1870, since which time it has decreased continually.

Summary of Farms by Acreage in California, 1850-1910.

Acreage	1850	1860	1870	1880	1890	1900	1910
Under 3 acres				143	401	1,492	1,269
3 acres and under 10		829	2,187	1,064	2,827	5,354	9,324
10 acres and under 20		1,102	1,086	1,430	4,010	8,236	11,932
20 acres and under 50		2,344	3,064	3,475	7,691	13,110	20,614
50 acres and under 100		2,428	3,224	3,969	5,796	8,067	10,801
100 acres and under 500		6,541	12,248	20,214	24,531	26,201	24,566
500 acres and under 1,000		538	1,202	3,108	4,367	5,329	5,119
1,000 acres and over		262	713	2,531	3,672	4,753	4,693
Total number of farms	872	18,716	23,724	35,934	53,295	72,542	88,197
Average acres per farm	4,465.6	466.4	481.7	461.8	405.0	397.4	316.7

Size of Farms, Improved and Unimproved, 1850-1910.

Acreage	1850	1860	1870	1880
Total number of acres in farms	3,893,985	8,730,034	11,427,105	16,593,742
Acres of improved land	32,454	2,468,034	6,218,133	10,669,698
Acres of unimproved land	3,861,531	6,262,000	5,208,972	5,924,044
Per cent of farm land improved	0.8	28.3	54.4	64.3

Acreage	1890	1900	1910
Total number of acres in farms	21,427,293	28,828,951	27,931,444
Acres of improved land	12,222,839	11,958,837	11,389,894
Acres of unimproved land	9,204,454	16,870,114	16,541,550
Per cent of farm land improved	57.6	41.5	40.8

Value of Farm Lands, 1912-1916.

The United States Department of Agriculture estimates the value per acre of farm lands in California and the United States as follows:

Plow Lands, 1916.

	Average for poor	Average for good	Average for all
California	$50 00	$135 00	$95 00
United States	40 08	72 79	58 39

All Farm Lands.

	Without improvements			With improvements		
	1912	1915	1916	1912	1915	1916
California	$70 00	$100 00	$110 00	$107 00	$175 00	$180 00
United States	36 23	40 85	45 55	57 89	64 82	69 45

TABLE

Number and Size of Farms

Counties	Under 3 acres	3 to 10 acres	10 to 20 acres	20 to 50 acres	50 to 100 acres
Alameda	148	589	405	424	204
Alpine				1	3
Amador	2	13	19	41	52
Butte	2	116	186	321	143
Calaveras		25	14	48	45
Colusa	1	31	35	85	42
Contra Costa	18	118	127	221	158
Del Norte		2	6	9	13
El Dorado		26	21	60	88
Fresno	6	267	598	3,240	951
Glenn		40	33	106	65
Humboldt	10	78	107	280	245
Imperial	51	46	56	182	227
Inyo	2	28	28	55	75
Kern	11	46	57	320	173
Kings	7	69	159	643	377
Lake	1	10	38	85	80
Lassen		9	4	12	32
Los Angeles	438	2,125	1,820	1,709	698
Madera		13	21	76	23
Marin	6	35	54	36	30
Mariposa		1	4	4	21
Mendocino		42	61	166	151
Merced	1	86	213	694	295
Modoc	5	18	13	21	44
Mono		3	1	1	4
Monterey	11	69	71	182	185
Napa	14	136	223	355	226
Nevada	7	61	36	77	69
Orange	28	531	802	1,043	351
Placer	2	52	109	289	206
Plumas		6	5	9	12
Riverside	42	462	596	614	262
Sacramento	12	167	237	321	170
San Benito	7	87	83	118	93
San Bernardino	76	567	918	703	278
San Diego	20	236	345	414	269
San Francisco	69	50	11	15	7
San Joaquin	9	204	531	797	397
San Luis Obispo	7	65	80	179	187
San Mateo	46	81	55	112	61
Santa Barbara	17	130	140	212	164
Santa Clara	68	773	1,186	1,317	562
Santa Cruz	18	226	198	384	293
Shasta	6	16	29	103	111
Sierra	1	6	3	4	5
Siskiyou	1	21	36	88	98
Solano	6	45	60	198	170
Sonoma	40	916	890	1,040	522
Stanislaus	13	153	319	1,046	439
Sutter		57	101	142	91
Tehama	7	34	119	198	102
Trinity	6	9	9	24	23
Tulare	9	171	390	1,247	647
Tuolumne	1	4	15	28	27
Ventura	13	87	120	199	214
Yolo	4	53	115	283	166
Yuba		13	20	33	34
Totals	1,269	9,324	11,932	20,614	10,680

VIII.

In 1910, by Counties.

100 to 175 acres	175 to 260 acres	260 to 500 acres	500 to 1,000 acres	1,000 acres and over	Total number of farms	Cost of fertilizers	
						1900	1910
238	116	163	91	44	2,422	$15,180	$17,723
4	9	14	3	8	42	----------	----------
145	64	105	58	38	537	2,140	208
220	127	171	116	98	1,500	21,150	24,935
171	60	127	80	62	632	840	694
90	30	129	104	120	667	8,640	266
256	147	206	140	74	1,465	10,990	1,879
31	11	23	10	9	114	----------	77
212	100	122	52	35	716	2,010	467
609	142	202	119	111	6,245	39,870	34,491
79	31	101	89	119	663	60	906
334	118	147	84	131	1,534	8,750	1,680
400	98	201	51	10	1,322	----------	681
113	41	54	22	20	438	90	221
222	55	116	82	85	1,167	4,420	1,430
287	77	133	42	43	1,837	920	790
144	60	84	53	48	603	170	40
117	51	130	84	63	502	8,700	63
531	192	207	114	85	7,919	200,310	669,152
151	27	66	59	137	573	300	608
35	40	72	111	79	498	4,000	35
97	15	101	51	36	330	420	60
334	131	193	124	154	1,356	5,330	866
165	46	89	100	167	1,856	4,730	3,609
229	68	171	92	75	736	4,280	5
27	12	16	10	17	91	500	----------
263	127	282	225	243	1,658	2,920	1,252
223	92	112	84	72	1,537	12,690	1,290
88	53	84	41	28	544	5,430	932
175	60	86	52	37	3,165	16,520	71,118
174	69	75	50	36	1,062	13,680	7,786
45	19	37	46	42	221	70	260
262	99	166	104	81	2,688	203,010	323,568
223	96	173	111	91	1,601	2,190	15,274
107	56	144	109	117	921	3,620	191
209	70	75	35	18	2,949	151,320	708,516
337	146	246	156	129	2,298	22,980	42,429
4	1	----------	----------	----------	157	5,600	6,031
395	217	371	221	144	3,286	20,750	10,657
267	123	304	288	214	1,714	2,200	1,027
90	52	67	60	41	665	2,070	13,450
185	105	138	93	171	1,355	8,870	8,133
376	141	147	75	86	4,731	25,490	16,703
188	60	52	25	22	1,466	1,450	3,537
300	96	190	93	66	1,010	990	1,086
25	4	19	18	25	110	1,310	140
388	84	199	124	75	1,114	3,890	571
167	89	156	144	108	1,143	17,700	4,142
508	233	299	202	122	4,772	12,030	12,585
192	83	125	142	175	2,687	1,570	23,180
123	84	123	78	74	873	1,000	80
151	51	119	86	139	1,006	15,720	685
148	23	41	15	10	308	170	170
597	198	364	197	201	4,021	8,900	41,765
105	35	88	43	40	386	2,220	1,347
207	142	155	90	66	1,293	8,780	57,432
170	83	189	107	85	1,255	16,110	5,050
82	30	93	64	67	436	1,700	2,765
12,015	4,689	7,862	5,119	4,693	88,197	$937,050	$2,143,993

Of all the farms in California, 23.4 per cent are from 20 to 49 acres in size, 13.6 per cent from 100 to 174 acres, 13.5 per cent from 10 to 19 acres, and 12.1 per cent from 50 to 99 acres. Thus over three-fifths of all the farms are from 10 to 174 acres in size. About one-fourth are 175 acres or more. The increase in the relative number of the smaller farms in conjunction with the decline in aggregate farm acreage during the last ten years indicates a tendency to subdivide the large farms into smaller ones.

The following table shows the increase or decrease in the size of farms in 1910, as compared with 1900:

Size	Number of farms		Increase or decrease	
	1900	1910	Number	Per cent
Under 3 acres	1,492	1,269	—223	—14.9
3 to 9 acres	5,354	9,324	+3,970	+74.2
10 to 19 acres	8,236	11,932	+3,696	+44.9
20 to 49 acres	13,110	20,614	+7,504	+57.2
50 to 99 acres	8,067	10,680	+2,613	+32.4
100 to 174 acres	13,196	12,015	—1,181	—8.9
175 to 259 acres	4,635	4,689	+54	+1.2
260 to 499 acres	8,370	7,862	—508	—6.1
500 to 999 acres	5,329	5,119	—210	—3.9
1,000 acres and over	4,753	4,693	—60	—1.3
Totals	72,542	88,197	+15,655	+21.6

Farm Tenure.

The number of all farmers is 88,197. Of these, 66,632 are classed as owners, 3,417 as managers, and 18,148 as tenants.

Of the 66,632 owners, 56,500 operate land owned exclusively by them, while 10,132 operate land which they rent in addition to that which they own. The owners hold 75.5 per cent of all farms, tenants 20.6 per cent, and 3.9 per cent is operated by managers. The percentage of tenants for the State (20.6) is above the average for the Pacific States (17.2), but low in comparison with the percentage for the United States as a whole (37).

Farm Mortgages.

The number of mortgaged farms in 1910 amounted to 40.5 per cent of the total number of 66,632 owned by farmers who own all their land, exclusive of those for which no mortgage report was obtained. The percentage is considerably higher than it was in 1890 and 1900:

Owned farms	Number
Free from mortgage	39,368
Mortgaged	26,749
Unknown	515
Total	66,632

TABLE IX.

Mortgage Debt on Farms Operated by Owners in 1910.*

Counties	Number free from mortgage	Number with mortgage	Number with no mortgage	Farms consisting of owned land only			
				Number reporting debt	Value of their land and buildings	Amount of mortgage	Per cent value of land and buildings
Alameda	1,204	467	19	384	$3,691,870	$958,687	26.0
Alpine	22	10		8	87,050	30,800	35.4
Amador	364	72	1	62	347,628	86,515	24.9
Butte	745	470	15	385	3,325,191	807,233	24.3
Calaveras	456	95	5	71	357,205	95,080	26.6
Colusa	251	196	2	123	1,443,045	444,355	30.8
Contra Costa	642	243	5	184	2,122,140	574,965	27.1
Del Norte	59	20		16	137,300	44,900	32.7
El Dorado	492	145	5	127	567,100	161,873	28.5
Fresno	2,072	3,128	27	2,734	24,983,327	6,388,563	25.6
Glenn	291	220	1	170	1,703,360	403,568	23.7
Humboldt	687	293	11	230	2,436,615	611,134	25.1
Imperial	584	236	4	194	2,867,600	697,384	24.3
Inyo	254	106	1	96	1,184,200	277,142	19.2
Kern	530	311	5	256	2,764,650	751,974	27.2
Kings	642	747	2	587	5,888,820	1,541,990	26.2
Lake	346	132	6	107	847,400	213,200	25.2
Lassen	290	122	2	108	1,464,400	272,163	18.6
Los Angeles	3,176	2,321	102	1,889	31,540,310	6,465,025	20.5
Madera	294	114	11	77	1,182,365	190,817	16.1
Marin	118	73	5	65	664,175	259,074	39.0
Mariposa	242	39	11	35	250,720	52,275	20.8
Mendocino	796	266	7	225	1,832,841	453,647	24.8
Merced	613	782	10	584	6,570,345	1,409,143	21.4
Modoc	432	159	3	130	1,786,230	354,669	19.9
Mono	63	12		10	230,900	52,350	22.7
Monterey	749	295	19	222	3,002,171	755,391	25.2
Napa	750	411	5	358	2,905,375	745,253	25.7
Nevada	398	76	2	63	260,165	56,270	21.6
Orange	1,294	1,228	9	957	12,557,760	2,934,955	23.4
Placer	478	269	1	217	1,614,735	371,680	23.0
Plumas	131	51	1	43	566,940	113,354	20.0
Riverside	1,279	996	16	816	11,969,410	2,953,463	24.7
Sacramento	673	326	12	273	3,894,145	840,241	21.6
San Benito	385	262	6	210	2,354,830	767,233	32.6
San Bernardino	1,344	1,178	10	961	17,434,500	3,958,213	22.7
San Diego	1,339	501	5	342	3,235,500	732,270	22.6
San Francisco	57	14	11	9	126,600	30,250	23.9
San Joaquin	1,181	1,172	17	887	8,729,605	2,272,853	26.0
San Luis Obispo	710	341	5	193	1,779,070	489,925	27.5
San Mateo	249	47	6	39	610,350	103,505	17.0
Santa Barbara	533	227	4	134	2,790,140	706,315	25.3
Santa Clara	2,092	1,500	30	1,186	11,700,415	3,391,948	29.0
Santa Cruz	671	410	7	357	3,667,630	815,705	22.2
Shasta	658	177	4	147	919,980	211,200	23.0
Sierra	72	21		17	160,500	48,350	30.1
Siskiyou	688	251	9	210	2,760,855	683,580	24.8
Solano	441	328	4	237	3,732,565	992,293	26.6
Sonoma	2,254	1,498	19	1,399	11,018,235	3,009,142	27.3
Stanislaus	890	1,301	9	972	9,721,155	2,394,773	24.6
Sutter	362	307	5	225	3,076,708	785,106	25.5
Tehama	518	288	4	241	2,061,515	543,342	26.4
Trinity	233	40	1	36	221,425	51,498	23.3
Tulare	1,778	1,511	18	1,197	15,911,023	3,263,701	20.5
Tuolumne	269	71	2	63	378,650	98,677	26.1
Ventura	497	393	5	229	6,013,275	1,098,618	18.3
Yolo	482	397	8	283	4,329,746	1,154,656	26.7
Yuba	248	83	1	50	417,430	114,374	27.4
Totals	39,368	26,749	515	21,430	$250,199,190	$60,036,660	24.0

*No mortgage reports were secured for farms operated by tenants or managers.

TABLE X.

Improved and Unimproved Farm Land by Counties, 1910.

Counties	Number of farms	Average acreage of farms	Improved land	Woodland in farms	Other unimproved land	Total land in farms
Alameda	2,422	128.5	177,314	51,484	82,529	311,327
Alpine	42	762.0	7,579	7,597	16,628	32,004
Amador	537	543.3	46,969	114,960	129,801	291,730
Butte	1,500	327.2	247,097	119,126	124,554	490,777
Calaveras	632	429.4	59,104	149,642	62,655	271,401
Colusa	667	783.2	336,509	38,252	147,615	522,376
Contra Costa	1,465	277.4	262,152	28,766	115,515	406,433
Del Norte	114	315.3	12,439	10,574	12,934	35,947
El Dorado	716	294.5	41,682	137,057	32,142	210,881
Fresno	6,245	177.2	590,205	93,194	423,217	1,106,616
Glenn	663	740.9	309,765	67,665	113,768	491,198
Humboldt	1,534	418.9	105,248	174,354	362,934	642,536
Imperial	1,322	169.1	176,069	1,138	46,395	223,602
Inyo	438	251.5	38,698	1,631	69,813	110,142
Kern	1,167	1,202.5	315,387	235,014	852,649	1,403,350
Kings	1,837	203.5	196,569	6,724	170,530	373,823
Lake	603	360.6	42,768	71,388	103,308	217,464
Lassen	502	589.1	122,057	27,688	145,983	295,728
Los Angeles	7,919	95.7	418,998	18,051	320,936	757,985
Madera	573	1,083.2	391,086	41,612	187,965	620,663
Marin	498	529.0	93,115	49,978	120,349	263,442
Mariposa	330	624.4	37,017	85,150	83,892	206,059
Mendocino	1,356	532.0	82,578	247,758	390,989	721,325
Merced	1,856	626.2	607,742	49,818	504,607	1,162,167
Modoc	736	557.2	164,784	75,668	169,682	410,134
Mono	91	1,271.1	43,382	8,303	63,987	115,672
Monterey	1,658	692.0	371,509	140,377	635,530	1,147,416
Napa	1,537	234.6	101,114	193,578	65,888	360,580
Nevada	544	322.4	24,542	48,449	102,407	175,398
Orange	3,165	117.4	189,463	4,476	177,753	371,692
Placer	1,062	233.6	98,608	32,194	117,278	248,080
Plumas	221	607.5	54,281	27,238	52,740	134,259
Riverside	2,688	193.8	278,151	30,231	212,424	520,806
Sacramento	1,601	295.5	275,682	20,964	176,398	473,044
San Benito	921	591.0	186,573	52,466	305,262	544,301
San Bernardino	2,949	70.7	136,625	23,137	48,634	208,396
San Diego	2,298	363.1	234,045	71,020	529,361	834,426
San Francisco	157	13.3	1,562	289	240	2,091
San Joaquin	3,286	232.2	611,762	35,387	115,899	763.048
San Luis Obispo	1,714	926.9	326,928	174,891	1,086,841	1,588,660
San Mateo	665	241.6	100,800	27,334	32,521	160,655
Santa Barbara	1,355	826.9	215,552	276,071	628,852	1,120,475
Santa Clara	4,731	155.3	237,170	153,835	343,814	734,819
Santa Cruz	1,466	107.3	66,875	44,157	46,276	157,308
Shasta	1,010	385.4	96,217	151,113	141,888	389,218
Sierra	110	765.6	30,794	18,168	35,258	84,220
Siskiyou	1,114	409.2	186,147	82,544	187,185	455,876
Solano	1,143	415.5	310,452	44,534	119,880	474,866
Sonoma	4,772	156.0	248,271	278,507	217,866	744,644
Stanislaus	2,687	241.7	512,189	18,756	118,447	649,392
Sutter	873	441.5	199,510	13,956	171,996	385,462
Tehama	1,006	909.8	186,642	206,234	522,351	915,227
Trinity	308	296.5	13,300	31,882	46,128	91,310
Tulare	4,021	259.9	507,024	161,360	376,847	1,045,231
Tuolumne	386	500.2	36,407	62,215	94,450	193,072
Ventura	1,293	425.5	213,868	56,061	280,270	550,199
Yolo	1,255	369.2	317,268	77,576	68,539	463,383
Yuba	436	571.3	94,250	70,175	84,683	249,108
Totals	88,197	av. 316.7	11,389,894	4,541,767	11,999,783	27,931,444

Farm Land.

Farm land is divided into (1) improved land, (2) woodland, and (3) all other unimproved land. *Improved land* includes all land regularly tilled or mowed, land pastured and cropped in rotation, land lying fallow, land in gardens, orchards, vineyards, and nurseries, and land occupied by farm buildings. *Woodland* includes all land covered with natural or planted forest trees, which produce, or later may produce, firewood or other forest products. *All other unimproved land* includes brush land, rough or stony land, swamp land, and any other land which is not improved or in forest. The census classification of farm land as "improved land," "woodland," and "other unimproved land" is one not always easy for the farmers or enumerators to make, and the statistics therefore must be considered at best only a close approximation.

Irrigation, 1900-1910.*

Of the 88,197 farms in the State, 39,352, or rather more than two-fifths (44.6 per cent), are irrigated. The total acreage irrigated is 2,664,104 acres, or 23.4 per cent of the improved land in farms. The enterprises existing in 1910 were capable of supplying water to 3,619,378 acres, and the total acreage included in irrigation projects, completed or under way, was 5,490,360 acres.

The following table shows the number of farms irrigated in comparison with the total number of farms in the State, the total land area, the total land in farms, and the total acreage of improved land in farms, together with the areas not yet irrigated for which water was available, and the acreage included in projects completed or under way:

Land and farms	1900	1910	Increase or decrease	
			Amount	Per cent
Number of all farms	72,542	88,197	15,655	21.6
Approximate land area of State	99,617,280	99,617,280		
Land in farms	28,828,951	27,931,444	—897,507	—3.1
Improved land in farms	11,958,837	11,389,894	—568,943	—4.8
Number of farms irrigated	25,675	39,352	13,677	53.3
Acreage irrigated	1,446,114	2,664,104	1,217,990	84.2
Acreage enterprises capable of irrigating	†	3,619,378		
Acreage included in projects	†	5,490,360		
Percentage irrigated of number of all farms	35.4	44.6	9.2	
Approximate land area of State	1.5	2.7	1.2	
Land in farms	5.0	9.5	4.5	
Improved land in farms	12.1	23.4	11.3	
Excess of acreage enterprises were capable of irrigating over acreage irrigated in 1910		955,274		
Excess of acreage included in projects over acreage irrigated in 1910		2,826,256		

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*For complete details see Part VI.
†No record.

Domestic Animals.

Cattle not being native to America, there are no strictly American breeds, but owing to difference in climate, care and ideals of American breeders, the European breeds which have been brought to America have changed to some extent.

Summary of All Domestic Animals and Their Value, 1910.*

Kind	On farms		Not on farms		Total	
	Number	Value	Number	Value	Number	Value
All cattle	2,077,025	$52,785,068	46,176	$1,604,717	2,123,201	$54,389,785
Dairy cows	467,332	18,597,328	29,962	1,321,897	497,294	19,919,225
Horses	468,886	47,099,196	132,521	15,142,841	601,407	62,242,037
Mules	69,761	9,016,444	10,612	1,638,381	80,373	10,654,825
Asses and burros	2,592	347,315	1,057	45,114	3,649	392,429
Swine	766,551	5,106,803	12,168	100,761	778,719	5,207,564
Sheep	2,417,477	8,348,997	64,631	232,572	2,482,108	8,581,569
Goats	138,413	320,829	7,113	32,629	145,526	353,458
Totals		$123,024,652		$18,797,015		$141,821,667

*Most of the domestic animals not on farms are found in cities, towns, and villages.

Neat Cattle.

Considerable attention has been given to breeding cows for dairy purposes only, and with this object in view large importations have been made of the Jerseys, Guernseys and Alderneys.

The Shorthorns, Herefords, and Polled Angus comprise practically all of the pure-blooded cattle in the United States used for breeding and for grading up native cattle for beef purposes. There are now also a number of Holstein-Friesians and Durhams.

Working Oxen.

In the early days oxen were largely employed in farming operations. In 1860 they numbered upward of 26,000, but the number declined rapidly during the next ten years, and after 1890 they dwindled away.

Asses and Burros.

In 1832, Henry Clay, who was a great advocate of the use of mules, brought the first pure-blooded Catalonian jack to Kentucky, and from then until the civil war quite a number of jacks were imported. With the revival of business after the war, there was a great demand for jacks, and they were imported from all the Mediterranean countries.

Until this time there had been but two breeds of asses generally recognized in this country, Maltese and Spanish. The importations into Tennessee and Kentucky have resulted in the production of a native type that is regarded by some breeders as better than any now imported.

There are also a large number of small donkeys, or burros, descendants of the small asses brought into Mexico and New Mexico at the early settlement of that section by the Spaniards, and are used principally by the Spanish and Mexican element. They are most useful in the mountainous sections.

Sheep.

In 1565, Spanish sheep were introduced into Florida, and those in that state today preserve traces of their Spanish origin. In 1773 they were introduced into California, and under the care of the Missions rapidly increased until, in 1825, it was estimated that seventeen of these Missions, extending from San Diego to San Francisco, held an aggregate of 1,003,970 sheep, exclusive of flocks owned by ranchers.

Sheep, of which at one time there were very large flocks, have fallen off since the year 1880, when they numbered 4,152,349; in 1910 there were 2,417,477, or a decrease of 1,734,872 since the former year.

The following statement shows at a glance the changes that have taken place in the number of domestic animals during the last sixty years:

Summary of the Number of Domestic Animals, 1850-1910.

Year	Horses and colts	Mules and colts	Cows and calves	Other cattle	Sheep and lambs	Swine
1850	21,719	1,666	4,280	258,379	17,574	2,776
1860	160,610	3,681	205,407	974,735	1,088,002	456,396
1870	192,273	17,533	164,093	467,305	2,768,187	444,617
1880	237,710	28,343	210,078	604,966	5,727,349	*868,419
1890	*455,073	*53,627	317,201	*1,291,217	3,373,036	*594,009
1900	421,293	96,190	307,245	*1,137,379	2,803,509	598,336
1910	468,886	69,761	467,332	1,609,693	2,417,477	766,551

Prior to 1890, asses and burros were included with mules.
*Including estimated number of range animals separately reported.

The principal breeds now are Southdown, Shropshire, Leicestershire, Cotswold, Oxford Down, Hampshire Down, Dorset Horns, Spanish and French Merino, and Persian.

Goats.

The Angora goat, a native of Asia Minor, was introduced into this country in 1849, and has been bred extensively in the United States. It crosses readily with the common goat, and the cross-breed frequently becomes the foundation of a good flock of fleece-bearing animals. The common goat has often been described as the poor man's cow. The Angora goat has been found to be of great service in clearing land of brush and low growths that sheep and cattle will not touch. The meat of the kids is said to be fully equal to the best young lamb, from which it is difficult to distinguish it. Angoras are among the most useful of domestic animals. Their fleeces, called the mohair, furnish material for the manufacture of some of the finest fabrics, their flesh is exceedingly delicate and nutritious, and their milk is richer than that of a cow.

The number of goats of all kinds in 1910 was 138,000, the lead being taken by Tehama County, with 28,000, and Shasta, with 18,000. Lake and Mendocino counties lead in Angora goats, having upward of 5,000 each.

Swine.

The swine introduced into the United States by the early colonists were of inferior stock. Between 1818 and 1830, the Chester White was evolved. The Berkshire was introduced from England about 1830, but did not come into general favor until 1870 to 1880. The Poland-China originated in Ohio between 1838 and 1840. Other breeds are Yorkshires and Hampshires. The interest in swine breeding in recent years is illustrated by the dates of first registration of the different Swine Breeders' Associations, which were as follows: American Berkshire, 1875; Standard Poland-China, 1877; Central Poland-China, 1879; American Chester White, 1884; American Essex, 1887; American Duroc-Jersey and Standard White, 1890.

As a result of this interest, swine in this country have attained a high standard, with regard to form, bone, and line of maturity.

RECOGNIZED BREEDS AND PUREBRED ANIMALS IMPORTED.

(Under an act of Congress, approved August 5, 1909, effective on and after November 11, 1913.)

Horses.

Name of breed	Book of record
Belgian Draft	Studbook des Chevaux de Trait Belges
Clydesdale	Clydesdale Studbook
French Draft	Studbook des Chevaux de Trait Francais
Hackney	Hackney Studbook
Percheron	Studbook Percheron de France
Shetland Pony	Shetland Pony Studbook
Shire	Shire Horse Society Studbook
Suffolk	Suffolk Studbook
Thoroughbred	*Australian Studbook
Thoroughbred	*Studbook Francais Registre des Chevaux de Pur Sang
Thoroughbred	General Studbook
Welsh Pony and Cob	Welsh Pony and Cob Studbook

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*Provided that no animal or animals registered in the Australian or in the French Thoroughbred Studbooks shall be certified as purebred unless such animal or animals trace in all crosses to animals which are proved to the satisfaction of the department to be of the thoroughbred breed and to have been imported from England.

Dogs.

Name of breed	Book of record
Belgian (Griffon Bruxellois, Schipperke, Chien de Berger Belges)	Livre des Orignes Saint-Hubert
Fifty-seven recognized breeds	Kennel Club Studbook
Foxhound	Foxhound Kennel Studbook
Greyhound	Greyhound Studbook
Harrier and Beagle	Harrier and Beagle Studbook
Swiss	Schweizerisches Hunde-Stammbuch
German Shepherd	Zuchtbuch fur Deutsche Schaferhunde

Provided that no dog or dogs registered in the above-mentioned books shall be certified as purebred unless a three-generation certificate of pedigree issued by one of the above-mentioned societies is submitted for each dog.

Cats.

Name of breed	Book of record
Long haired and short haired	Register of the Governing Council of the Cat Fancy, 65-66 Chancery Lane, London, England

The recognized breeds of cattle, sheep and hogs are as follows:

Cattle.

Aberdeen-Angus.
Alderney.
Ayrshire.
Devon.
Galloway.
Guernsey.
Hereford.
Highland.
Holstein-Friesian.
Jersey.
Kerry and Dexter.
Red Polled.
Shorthorn.
Sussex.
Welsh.

Sheep.

Cheviot.
Cotswold.
Dorset Horn.
Hampshire Down.
Kent or Romney Marsh.
Kerry Hill.
Leicester.
Leicester [Border].
Lincoln.
Shropshire.
Southdown.
Suffolk.
Wensleydale.
Oxford Down.

Hogs.

Berkshire.
Large Black.
Yorkshire.
Tamworth.

Recognized Breeds and Books of Record in Canada.

The Canadian National Records are recognized for the following breeds, provided that no animal or animals registered in the Canadian National Records shall be certified by the Secretary of Agriculture as purebred unless such animal or animals trace, in all crosses, to animals which are proved to the satisfaction of the department to be of the same breed and to have been imported from the country in which the breed originated.

Horses.

Belgian Draft.
Clydesdale.
Hackney.
Percheron.
Shire.
Standard Bred.
Suffolk.
Thoroughbred.
Welsh Pony and Cob.

The Canadian National Records for dogs are recognized for all the breeds registered in said records; provided, that no dog or dogs registered in said records shall be certified as pure bred unless a three-generation certificate of pedigree, issued by the said Canadian National Records, is submitted for each dog.

CLASSIFIED SUMMARY OF DOMESTIC ANIMALS ON FARMS IN 1910.

Description	Number	Value	Average value
Cattle—			
Dairy cows (cows and heifers kept for milk, born before January 1, 1909)	467,332	$18,597,328	$39 79
Other cows (cows and heifers not kept for milk, born before January 1, 1909)	576,909	14,798,012	25 65
Heifers born in 1909	218,480	3,448,595	15 78
Calves born after January 1, 1910	267,799	1,883,523	7 03
Steers and bulls born in 1909	163,728	2,889,503	17 65
Steers and bulls born before January 1, 1909	321,984	9,941,169	30 87
Unclassified cattle	60,793	1,226,938	20 18
Totals	2,077,025	$52,785,068	*$25 41
Horses and colts—			
Mares, stallions and geldings born before January 1, 1909	402,584	$43,770,557	$108 72
Colts born in 1909	41,927	2,389,191	56 98
Colts born after January 1, 1910	23,037	767,648	33 32
Unclassified horses	1,338	171,800	128 40
Totals	468,886	$47,099,196	*$100 45
Mules and mule colts—			
Mules born before January 1, 1909	61,997	$8,552,021	$137 94
Mule colts born in 1909	4,913	351,667	71 58
Mule colts born after January 1, 1910	2,851	112,756	39 55
Totals	69,761	$9,016,444	*$129 25
Asses and burros (all ages)	2,592	$347,315	*$133 99
Swine—			
Hogs and pigs born before January 1, 1910	482,810	$4,346,824	$9 00
Pigs born after January 1, 1910	283,741	759,979	2 68
Totals	766,551	$5,106,803	*$6 66
Sheep and lambs—			
Ewes born before January 1, 1910	1,217,515	$4,914,783	$4 04
Rams and wethers born before January 1, 1910	307,773	1,326,699	4 31
Lambs born after January 1, 1910	892,189	2,107,515	*2 36
Totals	2,417,477	$8,348,997	*$3 45
Goats and kids (all ages)	138,413	$320,829	*$2 32
Grand total	------------	$123,024,652	

*Average.

Sheep and Wool, Goats and Mohair, in 1909-1910.

According to the Census Bureau, the total number of sheep of shearing age in California on April 15, 1910, was 1,525,000, representing a decrease of 11.6 per cent as compared with the number in 1900. The approximate production of wool during 1909 was 2,563,000 fleeces, weighing 14,065,000 pounds and valued at $2,424,000.

Although 1,714 farmers reported 138,413 goats and kids on their farms in 1910, only 367 reported the production of goat hair or mohair during 1909. These farmers reported 102,134 fleeces, weighing 282,596 pounds and valued at $60,821. The production shows a considerable increase between 1899 and 1909, but it is believed that the figures are somewhat short of the actual production.

Number and Value of Farm Animals in 1915, Compared With 1914.

During the past year there has been no change of importance in the number of farm animals. The number of horses show a falling off of from 503,000 in 1914, to 493,000 in 1915, but the average value remains about the same.

The number of purebred certificated stallions and mares imported in 1914 for breeding purposes amounted to 1,210 of which number 524 were Percherons and 391 Belgian Draft; but the total number imported in 1915 amounted to only 301.

The number of mules also shows a decline from 74,000 in 1914, to 70,000 in 1915, and the average value per head declined from $120 to $110. Milch cows show an increase of 27,000, the number in 1914 being 541,000 and in 1915, 568,000, but the average value per head declined from $72 to $69.

Other cattle increased from 1,480,000 in 1914 to 1,554,000 in 1915, but the average value declined from $39.30 to $36.30 per head.

The number of sheep was 50,000 less than the previous year, the number in 1914 being 2,500,000, and in 1915, 2,450,000, but the average price of sheep of all ages increased from $4.50 to $5 per head. Swine show an increase of 70,000, the number being 877,000 in 1914 and 947,000 in 1915, but the average value declined from $10.50 to $8.40 per head.

Imports and Exports.

[NOTE.—The statistics here given are for the calendar year ending December 31.]

The number of horses imported free for breeding purposes was 2,852 in 1914 and 12,406 in 1915. Other horses on which duty was paid numbered 22,912 in 1914 and 12,406 in 1915. The number of horses exported in 1913 was 29,356, value $4,217,928; in 1914, 92,923, value $17,461,687, and in 1915, 443,014, value $94,827,171. The figures for the last two years show the demand owing to the war in Europe. Of the number exported in 1915, 203,391 went to France, 104,273 to the United Kingdom, 95,951 to Canada, 3,829 to Mexico, and the balance of 35,570 to other countries.

The number of mules exported in 1913 was 5,075, value $797,370; in 1914, 9,771, value $1,675,130, and in 1915, 122,006, value $23,825,924. On the other hand the number of sheep exported shows a large falling off during the last three years. In 1913 the number was 170,411, value $595,324; in 1914, 78,227, value $317,939, and in 1915, 40,501, value $171,361.

The number of cattle imported free for breeding purposes was 552,489 in 1915, compared with 727,891 in 1914. Of this number as in the previous year the greater number came from Mexico and Canada, the number from Mexico in 1915 being 304,744 and from Canada 244,913, and only 634 from the United Kingdom. The number of cattle exported in 1914 was 8,694; and in 1915, 16,253.

Of sheep 199,995 were imported for breeding purposes in 1914; and 276,521 in 1915. No others were imported.

The number of hogs was not given separately in the custom returns until July 1, 1915, being included under the heading of "All other animals, but the number imported for breeding purposes from July 1 to December 31, 1915, was 3,578. The number of hogs exported was 12,399 in 1914, and 7,260 in 1915.

NUMBER AND VALUE OF FARM ANIMALS IN CALIFORNIA, 1875-1915 IMPORTS AND EXPORTS, 1905-1915.

(Compiled from the reports of the United States Department of Agriculture.)

HORSES, 1875-1915.

Year	Number, December 31	Average farm price, December 31	Farm value, December 31
1875	230,100	$41 61	$9,574,461
1876	209,300	45 46	9,514,778
1877	260,000	39 50	10,270,000
1878	262,000	40 94	10,750,844
1879	273,000	43 95	11,998,350
1880	273,000	46 18	12,673,500
1881	281,990	45 03	12,698,010
1882	240,087	47 30	11,356,115
1883	240,567	54 89	13,204,723
1884	252,595	61 33	15,491,651
1885	265,225	62 05	16,457,211
1886	275,834	63 00	17,377,542
1887	289,626	64 00	18,534,948
1888	307,004	71 00	21,797,255
1889	368,400	70 19	25,857,259
1890	372,084	63 60	23,664,984
1891	360,921	67 22	24,262,579
1892	415,059	62 67	26,010,045
1893	518,824	57 48	29,821,982
1894	513,636	41 98	21,562,949
1895	513,636	31 94	16,404,965
1896	482,818	27 16	13,114,254
1897	439,364	27 40	12,037,918
1898	417,396	28 96	12,085,909
1899	342,265	27 54	9,426,483
1900	321,729	38 61	12,422,429
1901	363,982	49 66	18,074,805
1902	353,063	56 28	19,869,542
1903	370,716	60 66	22,485,881
1904	367,000	65 66	24,099,139
1905	363,339	67 48	24,518,741
1906	399,673	76 32	30,505,037
1907	391,680	92 00	36,120,721
1908	396,000	94 00	37,224,000
1909	412,000	90 00	37,080,000
1910	483,000	105 00	49,245,000
1911	493,000	117 00	57,681,000
1912	503,000	109 00	54,827,000
1913	498,000	100 00	49,800,000
1914	503,000	100 00	50,300,000
1915	493,000	96 00	47,328,000

Horses Imported, 1905-1915.

Year	For breeding purposes*		Other horses		Total horses	
	Number	Value	Number	Value	Number	Value
1905	2,853	$1,169,011	2,327	$422,072	5,180	$1,591,083
1906	3,377	1,266,987	2,644	449,688	6,021	1,716,675
1907	3,644	1,574,020	2,436	404,085	6,080	1,978,105
1908	3,562	1,325,784	1,925	278,608	5,487	1,604,392
1909	4,953	1,658,640	2,131	348,636	7,084	2,007,276
1910	7,867	2,660,241	3,753	635,781	11,620	3,296,022
1911	6,331	2,055,418	3,662	636,656	9,593	2,692,074
1912	3,849	1,579,377	2,758	343,648	6,607	1,923,025
1913	5,713	1,653,713	4,295	472,162	10,008	2,125,875
1914	4,406	1,476,905	28,613	1,128,124	33,019	2,605,029
1915	1,849	473,138	10,803	504,242	12,652	977,380

*Including teams of immigrants.

Horses Exported, 1905-1915.

Year	Number	Value
1905	34,822	$3,175,259
1906	40,087	4,365,981
1907	33,882	4,359,957
1908	19,000	2,612,587
1909	21,616	3,386,617
1910	28,910	4,081,157
1911	25,145	3,845,253
1912	34,828	4,764,815
1913	28,707	3,960,102
1914	22,776	3,388,819
1915	289,340	$64,046,534

Duty on Imported Horses.—For breeding purposes and purebred and teams of immigrants, free. All others, 10 per cent ad valorem on October 4, 1913, and after.

Certificated Horses Imported, 1914.

The following table shows the number of certificated horses imported for breeding purposes during the calendar year ending December 31, 1914, for which certificates of pure breeding have been issued by the Federal department; 18 additional horses were certified after this list was published, making a total of 1,228; the details for 1915 have not yet been issued, but owing to the war the numbers show a large decrease, the total number imported during the calendar year 1915 amounting to only 301.

Breeds	Stallions	Mares	Total
Belgian draft	234	157	391
Clydesdale	17	34	51
Hackney	3	19	22
Percheron	343	181	524
Shetland pony	2	22	24
Shire	54	14	68
Shetland pony	2	22	24
Suffolk	11	19	30
Thoroughbred	31	5	36
Welsh pony	11	49	60
Totals	708	502	1,210

NOTE.—For full details regarding the number and different breeds of stallions in the State, see the Report of the California Stallion Registration Board. For further information relating to Working Oxen, Sheep and Goats, see the Statistical Report of the State Board of Agriculture for 1913.

MULES, 1875-1915.

Year	Number, December 31	Average farm price, December 31	Farm value, December 31
1875	23,200	$66 49	$1,542,568
1876	19,400	77 20	1,497,680
1877	26,500	67 75	1,795,375
1878	25,400	68 98	1,752,092
1879	25,700	66 24	1,702,368
1880	25,700	67 54	1,735,778
1881	25,700	68 79	1,767,903
1882	28,910	69 20	2,000,572
1883	30,066	70 98	2,134,085
1884	29,765	80 18	2,386,558
1885	31,551	84 30	2,659,749
1886	31,551	77 65	2,450,081
1887	36,284	83 67	3,035,912
1888	38,824	85 03	3,301,389
1889	40,765	83 78	3,415,201
1890	42,803	78 21	3,347,496
1891	43,659	79 41	3,467,093
1892	54,574	74 72	4,077,548
1893	60,031	67 90	4,076,130
1894	63,033	56 38	3,553,899
1895	63,033	46 25	2,915,041
1896	59,251	35 02	2,074,789
1897	57,473	36 89	2,120,329
1898	56,898	38 33	2,180,836
1899	52,915	34 15	1,807,174
1900	48,682	48 49	2,300,713
1901	77,452	60 44	4,681,555
1902	72,030	69 23	4,986,745
1903	67,708	72 02	4,876,600
1904	67,031	72 68	4,871,487
1905	66,361	76 39	5.069,044
1906	69,679	91 30	6,361,689
1907	80,750	106 00	8,599,875
1908	82,000	113 00	9,266,000
1909	83,000	107 00	8,881,000
1910	71,000	122 00	8,540,000
1911	72,000	136 00	9,792,000
1912	73,000	130 00	9,490,000
1913	73,000	120 00	8,760,000
1914	74,000	120 00	8,880,000
1915	70,000	110 00	7.700,000

Mules Imported.

(Included in "All Other" Animals.)

Mules Exported, 1905-1915.

Year	Number	Value
1905	5,826	$645,464
1906	7,167	989,639
1907	6,781	850,901
1908	6,609	990,667
1909	3,432	472,017
1910	4,512	614,094
1911	6,585	1,070,051
1912	4,901	732,095
1913	4,744	733,795
1914	4,883	690,974
1915	65,788	$12,726,143

Duty on Imported Mules.—Teams of immigrants, free. All others, 10 per cent ad valorem on October 4, 1913, and after.

MILCH COWS, 1875-1915.

Year	Number, December 31	Average farm price, December 31	Farm value, December 31
1875	340,000	$32 19	$10,944,600
1876	363,800	31 46	11,445,148
1877	381,900	30 64	11,701,416
1878	389,500	28 23	10,955,585
1879	459,600	25 90	11,903,640
1880	473,400	28 65	13,562,910
1881	473,400	31 67	14,992,578
1882	214,280	32 70	7,006,956
1883	214,280	36 17	7,750,508
1884	220,708	38 00	8,386,904
1885	231,743	38 50	8,922,106
1886	236,378	38 75	9,159,648
1887	243,469	33 22	8,088,040
1888	250,773	33 00	8,275,509
1889	258,296	31 38	8,105,328
1890	268,628	27 75	7,454,427
1891	282,059	29 00	8,179,711
1892	290,521	26 95	7,829,541
1893	299,237	27 25	8,154,208
1894	329,161	25 82	8,498,937
1895	339,036	23 78	8,062,276
1896	335,646	23 75	7,971,593
1897	339,002	25 57	8,668,281
1898	342,392	28 65	9,809,531
1899	318,425	28 00	8,915,900
1900	308,872	33 75	10,424,430
1901	321,227	37 10	11,917,522
1902	327,652	40 05	13,122,463
1903	337,482	40 43	13,664,397
1904	344,232	38 55	13,270,144
1905	354,559	36 57	12,966,223
1906	390,015	34 65	13,514,020
1907	405,616	35 00	14,196,560
1908	410,000	36 00	14,760,000
1909	430,000	36 00	15,480,000
1910	495,000	38 40	17,933,000
1911	505,000	53 00	26,765,000
1912	510,000	53 50	27,285,000
1913	515,000	62 00	31,930,000
1914	541,000	72 00	38,952,000
1915	568,000	69 00	39,192,000

OTHER CATTLE, 1875-1915.

Year	Number, December 31	Average farm price, December 31	Farm value, December 31
1875	660,000	$18 92	$12,487,200
1876	1,075,000	20 08	21,586,000
1877	1,053,500	16 52	17,403,820
1878	1,600,800	17 23	17,243,784
1879	1,010,000	18 91	19,099,100
1880	999,900	18 47	18,468,153
1881	999,900	20 35	20,347,965
1882	422,433	21 77	9,196,366
1883	575,000	27 48	15,801,000
1884	609,500	29 15	17,766,925
1885	615,595	30 38	18,701,776
1886	627,907	28 66	17,994,559
1887	659,302	20 64	13,607,595
1888	692,267	20 50	14,194,447
1889	726,880	19 37	14,080,181
1890	697,805	16 80	11,719,707
1891	558,244	17 73	9,895,321
1892	602,904	17 39	10,481,663
1893	916,414	17 12	15,690,840
1894	925,578	16 17	14,962,157
1895	916,322	15 28	14,003,785
1896	888,832	15 82	14,057,319
1897	853,279	16 93	14,448,828
1898	810,615	18 91	15,328,334
1899	664,704	18 01	11,970,981
1900	604,881	24 57	14,864,947
1901	1,048,046	22 25	23,315,670
1902	1,089,968	23 48	25,593,770
1903	1,111,767	24 51	27,244,079
1904	1,089,532	21 98	23,944,214
1905	1,122,218	19 29	21,648,258
1906	1,167,107	17 52	20,453,549
1907	1,167,107	18 00	21,474,767
1908	1,155,000	19 00	21,945,000
1909	1,155,000	17 50	20,212,000
1910	1,546,000	20 10	32,361,000
1911	1,515,000	26 70	40,450,000
1912	1,454,000	29 20	42,457,000
1913	1,410,000	33 00	46,530,000
1914	1,480,000	39 30	58,164,000
1915	1,554,000	36 30	56,410,000

Cattle Imported, 1905-1915.

Year	For breeding purposes*		Other cattle		Total cattle	
	Number	Value	Number	Value	Number	Value
1905	2,314	$93,084	25,541	$365,488	27,855	$458,572
1906	829	118,368	28,190	430,062	29,019	548,430
1907	835	122,230	31,567	442,892	32,402	565,122
1908	3,188	149,142	89,168	1,358,168	92,356	1,507,310
1909	3,049	140,713	136,135	1,858,709	139,184	1,999,422
1910	2,611	291,139	193,327	2,708,685	195,138	2,999,824
1911	2,441	362,220	180,482	2,590,857	182,923	2,953,077
1912	2,129	305,222	316,243	4,500,352	318,372	4,805,574
1913	1,388	234,489	420,261	6,406,179	421,649	6,640,668
1914	718,352	16,328,819	150,016	2,367,899	868,368	18,696,718
1915	538,167	17,513,175	----------	------------	538,167	17,513,175

*Including teams of immigrants.

Cattle Exported, 1905-1915.

Year	Number	Value
1905	567,806	$40,598,048
1906	584,239	42,081,170
1907	423,051	34,577,392
1908	349,210	29,339,134
1909	207,542	18,046,976
1910	139,430	12,200,154
1911	150,100	13,163,920
1912	105,506	8,870,075
1913	24,714	1,177,199
1914	18,376	647,288
1915	5,484	$702,847

Duty on Imported Cattle.—Free October 4, 1913, and after.

SHEEP, 1875-1915.

Year	Number, December 31	Average farm price, December 31	Farm value, December 31
1875	4,683,200	$2 53	$11,848,496
1876	6,750,000	2 02	13,635,000
1877	7,290,000	1 40	10,206,000
1878	6,561,000	1 52	9,972,720
1879	6,889,000	1 61	11,091,290
1880	7,646,800	1 62	12,387,816
1881	7,493,864	1 70	12,739,569
1882	6,352,344	1 65	10,481,368
1883	5,907,680	2 02	11,933,514
1884	6,203,064	1 90	11,785,822
1885	5,892,911	1 89	11,137,602
1886	6,069,698	1 81	10,961,268
1887	6,069,698	1 77	10,728,192
1888	5,462,728	1 88	10,291,779
1889	3,956,000	1 88	7,453,104
1890	4,035,120	2 08	8,409,190
1891	3,712,310	2 20	8,157,801
1892	4,083,541	2 42	9,884.211
1893	4,124,376	2 32	9,559,479
1894	3,918,157	1 81	7,074,625
1895	3,526,341	1 65	5,817,052
1896	2,962,126	1 85	5,483,784
1897	2,577,050	1 86	4,800,787
1898	2,589,935	2 23	5,785,915
1899	2,175,545	2 64	5,742,352
1900	2,001,501	2 85	5,710,282
1901	2,342,923	3 00	7,033,221
1902	2,319,494	2 90	6,729,085
1903	2,365,884	2 92	6,915,716
1904	2,271,249	2 75	6,237,758
1905	2,180,399	2 67	5,824,718
1906	2,398,439	3 03	7,273,266
1907	2,422,423	3 30	8,006,107
1908	2,422,000	3 47	8,404,000
1909	2,325,000	2 80	6,510,000
1910	2,683,000	3 30	9,694,000
1911	2,656,000	3 60	9,562,000
1912	2,603,000	3 70	9,631,000
1913	2,551,000	3 80	9,694.000
1914	2,500,000	4 50	11,250,000
1915	2,450,000	5 00	12,250,000

Sheep Imported, 1905-1915.

Year	For breeding purposes		Other sheep		Total sheep	
	Number	Value	Number	Value	Number	Value
1905	2,200	$45,319	184,742	$659,402	186,942	$704,721
1906	2,679	53,951	238,068	966,408	240,747	1,020,359
1907	3,081	67,555	221,717	1,052,870	224,798	1,120,425
1908	5,609	104,509	219,156	978,097	224,765	1,082,606
1909	4,860	89,272	97,803	413,368	102,663	502,640
1910	6,335	135,019	119,817	561,860	126,152	696,879
1911	5,341	116,277	48,114	261,348	53,455	377,625
1912	2,208	29,106	21,380	128,151	23,588	157,257
1913	388	8,903	15,040	81,118	15,428	90,021
1914	221,836	516,912	1,883	15,492	532,404	223,719
1915	153,317	$533,967			153,317	$533,967

Export of Domestic Sheep, 1905-1915.

Year	Number	Value
1905	268,365	$1,687,321
1906	142,690	804,090
1907	135,344	750,242
1908	101,000	589,285
1909	67,656	365,155
1910	44,517	209,000
1911	121,491	636,272
1912	157,263	626,985
1913	187,132	605,725
1914	152,600	534,543
1915	47,213	$182,278

Duty on Imported Sheep.—Free October 4, 1913, and after.

SWINE, 1875-1915.

Year	Number December 31	Average farm price December 31	Farm value December 31
1875	403,700	$5 77	$2,329,349
1876	363,300	7 17	2,604,861
1877	417,700	6 20	2,589,740
1878	438,500	6 27	2,749,395
1879	565,000	5 95	3,361,750
1880	661,000	3 97	2,624,170
1881	667,600	4 98	3,324,648
1882	585,443	6 20	3,629,747
1883	856,000	7 14	6,111,840
1884	950,160	5 66	5,377,906
1885	978,665	5 80	5,676,257
1886	1,027,598	4 15	4,266,586
1887	1,017,322	3 78	3,841,409
1888	1,047,842	4 62	4,836,000
1889	647,000	5 59	3,616,213
1890	647,000	4 91	3,175,476
1891	517,600	5 26	2,723,611
1892	512,424	5 35	2,741,675
1893	399,691	6 12	2,446,110
1894	435,663	5 57	2,427,342
1895	487,943	5 54	2,702,812
1896	507,461	4 03	2,045,677
1897	487,163	4 13	2,013,738
1898	467,676	4 08	1,906,247
1899	374,141	4 47	1,673,907
1900	329,244	6 26	2,061,068
1901	521,906	6 61	3,449,172
1902	506,249	6 79	3,439,457
1903	511,311	7 63	3,901,303
1904	526,650	6 55	3,449,558
1905	521,384	6 10	3,180,442
1906	573,522	5 45	3,125,695
1907	550,581	7 10	3,909,125
1908	551,000	7 20	3,967,000
1909	562,000	6 50	3,653,000
1910	790,000	8 20	6,289,000
1911	830,000	8 30	6,289,000
1912	822,000	9 20	7,562,000
1913	797,000	10 50	8,368,000
1914	877,000	10 50	9,208,000
1915	947,000	8 40	7,955,000

Swine Exported,* 1905-1915.

Year	Number	Value
1905	44,496	$416,692
1906	59,170	630,998
1907	24,262	309,440
1908	30,818	307.202
1909	18,655	144,605
1910	4,410	46,955
1911	8,551	74.032
1912	19,038	159,370
1913	15,332	151,747
1914	10,122	133,751
1915	7,799	$93,067

*Swine imported are not given separately, but included under "All Other" animals.

Duty on Imported Swine.—Free October 4, 1913, and after.

TABLE XI.

Horses, Mules and Colts, by Counties, 1910.

Counties	Mature horses	Yearling colts	Spring colts	Total	Mature mules	Yearling colts	Spring colts	Total
Alameda	9,266	842	536	10,644	223	4	----	227
Alpine	376	38	12	426	18	----	----	18
Amador	2,291	218	176	2,685	212	10	17	239
Butte	6,608	645	402	7,655	1,719	151	91	1,961
Calaveras	3,143	302	203	3,648	25	13	25	63
Colusa	3,992	481	259	4,732	4,607	437	247	5,291
Contra Costa	9,494	1,095	644	11,233	564	63	24	651
Del Norte	382	45	14	441	3	----	----	3
El Dorado	2,274	180	90	2,544	93	9	10	112
Fresno	22,063	1,899	1,047	25,009	3,498	298	183	3,979
Glenn	3,319	339	262	3,946	3,033	207	122	3,362
Humboldt	5,851	421	131	6,403	189	----	----	189
Imperial	6,277	580	372	7,229	1,583	69	20	1,672
Inyo	4,074	555	403	5,032	249	55	33	337
Kern	8,670	987	530	10,347	1,099	103	46	1,248
Kings	9,417	1,174	882	11,473	855	142	72	1,069
Lake	2,172	216	104	2,492	182	45	36	263
Lassen	7,548	1,406	561	9,515	414	185	103	702
Los Angeles	20,375	1,376	673	22,424	2,459	76	35	2,570
Madera	3,498	334	238	4,070	2,928	154	59	3,141
Marin	2,338	166	54	2,558	11	----	----	11
Mariposa	1,896	218	126	2,240	201	46	49	296
Mendocino	5,300	510	184	5,994	298	10	1	309
Merced	10,308	1,453	795	12,556	3,673	198	204	4,075
Modoc	12,247	2,212	976	*15,636	565	441	126	1,132
Mono	1,655	310	132	2,097	73	46	17	136
Monterey	14,172	1,993	1,268	*17,444	546	66	30	642
Napa	5,145	528	237	5,910	345	18	9	372
Nevada	1,830	124	70	*2,074	57	11	----	68
Orange	9,580	760	225	10,565	2,223	38	7	2,268
Placer	3,762	294	137	4,193	459	13	26	498
Plumas	1,770	206	68	2,044	41	2	----	43
Riverside	8,969	943	403	10,315	1,303	83	43	1,429
Sacramento	8,770	773	426	9,969	703	30	10	743
San Benito	6,921	955	599	8,475	74	19	3	96
San Bernardino	6,339	372	167	6,878	757	18	3	778
San Diego	9,663	1,130	705	11,498	683	60	23	766
San Francisco	318	----	1	319	----	----	----	----
San Joaquin	18,256	1,597	1,089	*20,972	3,169	217	144	3,530
San Luis Obispo	12,601	1,686	987	15,274	754	83	40	877
San Mateo	3,940	253	102	4,295	10	2	----	12
Santa Barbara	10,621	1,442	971	13,034	362	56	25	443
Santa Clara	14,405	899	512	15,816	267	7	----	274
Santa Cruz	3,914	260	116	4,290	84	4	----	88
Shasta	4,516	488	213	5,217	224	57	13	294
Sierra	1,199	155	40	1,394	20	----	----	20
Siskiyou	7,690	1,037	423	9,150	390	76	37	503
Solano	6,993	695	362	8,050	2,157	84	78	2,319
Sonoma	12,611	733	384	13,728	388	8	2	398
Stanislaus	11,818	1,120	619	*14,357	5,032	236	174	5,442
Sutter	4,869	587	228	5,684	1,922	107	67	2,096
Tehama	5,073	525	278	5,876	1,409	163	103	1,675
Trinity	1,150	117	39	1,306	142	19	7	168
Tulare	18,917	2,003	1,250	*22,200	3,149	288	218	3,655
Tuolumne	2,053	242	196	2,491	76	7	8	91
Ventura	9,955	906	589	*11,480	2,250	66	46	2,362
Yolo	7,127	814	374	8,315	3,501	265	189	3,955
Yuba	2,803	288	153	3,244	726	48	26	800
Totals	402,584	41,927	23,037	*468,886	61,997	4,913	2,851	69,761

*Includes animals, age or sex not specified.

TABLE XII.

Cattle by Counties in 1910.

Counties	Dairy cows	Other cows	Yearling heifers	Calves	Yearling steers and bulls	Other steers and bulls	Total
Alameda	9,172	5,827	2,609	4,113	1,107	1,491	*24,319
Alpine	759	661	485	426	400	23	2,754
Amador	2,747	7,985	2,175	3,444	1,970	3,945	22,266
Butte	4,713	8,359	2,605	3,772	2,109	4,660	*26,584
Calaveras	1,824	8,407	2,432	3,355	2,057	2,902	20,977
Colusa	3,128	6,571	2,140	2,606	1,556	2,619	*18,750
Contra Costa	9,469	6,567	3,240	4,479	1,123	1,651	26,529
Del Norte	3,575	620	849	1,306	273	234	6,857
El Dorado	2,823	4,338	1,683	2,154	1,138	912	13,048
Fresno	22,241	42,001	13,117	12,682	15,354	22,230	127,625
Glenn	3,688	3,601	1,410	2,409	1,925	2,051	*16,214
Humboldt	21,572	7,837	5,531	8,334	3,413	6,590	*53,775
Imperial	9,653	2,728	2,560	2,772	1,379	1,817	*22,741
Inyo	2,267	8,970	2,583	2,255	2,445	1,788	20,308
Kern	6,917	38,101	8,441	7,372	6,459	24,271	*118,320
Kings	18,593	21,655	7,281	8,793	3,745	14,908	74,975
Lake	1,487	2,113	821	1,133	574	1,286	7,414
Lassen	2,890	18,444	5,975	4,906	5,456	6,161	43,832
Los Angeles	20,524	8,027	5,561	6,211	1,666	1,106	43,095
Madera	1,592	12,406	2,425	2,975	2,252	3,946	*27,905
Marin	24,803	3,564	2,880	6,509	567	641	*39,266
Mariposa	905	7,477	1,602	2,115	1,683	2,876	*16,671
Mendocino	6,454	9,280	3,054	3,980	2,503	4,883	30,154
Merced	19,678	43,250	14,858	14,625	11,036	34,767	*150,467
Modoc	2,903	18,502	6,937	4,608	6,517	7,449	46,916
Mono	450	2,270	803	666	685	427	5,301
Monterey	14,066	27,626	11,046	13,806	7,502	13,133	*88,889
Napa	6,270	3,945	1,403	2,518	758	937	*15,866
Nevada	2,395	2,950	832	1,069	495	865	8,606
Orange	6,184	4,473	2,124	2,231	1,168	2,040	18,220
Placer	2,421	2,283	602	1,204	428	532	*7,510
Plumas	3,437	1,954	1,561	1,586	1,468	1,395	11,401
Riverside	5,235	4,449	2,493	2,203	1,333	3,755	19,468
Sacramento	11,979	5,484	3.195	5,568	1,529	1,961	*31,188
San Benito	4,828	11,064	4,459	5,864	4,151	8,987	*39,703
San Bernardino	3,043	4,389	1,075	926	481	2,847	12,761
San Diego	10,633	15,815	7,874	8,088	6,490	9,877	58,777
San Francisco	1,645	10	581	174	75	25	2,510
San Joaquin	11,904	6,861	3,636	4,960	1,937	1,998	31,296
San Luis Obispo	24,193	22,903	10,345	15,635	8,948	33,180	*118,704
San Mateo	8,119	2,305	1,848	2,375	369	272	15,288
Santa Barbara	11,690	23,752	6,891	11,524	8,666	24,578	*87,576
Santa Clara	12,181	12,251	4,449	5,443	3,133	7,552	*46,030
Santa Cruz	4,210	1,811	1,113	1,779	438	749	10,100
Shasta	2,923	15,433	3,678	3,308	3,197	5,580	34,119
Sierra	1,563	2,268	850	874	831	1,401	7,787
Siskiyou	7,018	14,781	5,965	4,919	5,359	6,513	*45,079
Solano	9,279	4,257	1,933	3,720	1,187	1,408	21,784
Sonoma	24,961	5,835	4,804	9,517	1,805	1,705	*48,727
Stanislaus	20,678	9,047	5,294	7,252	2,922	3,765	*49,132
Sutter	6,728	3,254	1,939	2,623	1,012	823	*16,604
Tehama	3,462	10,691	2,646	3,520	2,590	2,400	25,309
Trinity	804	5,143	1,415	1,126	1,308	2,089	11,885
Tulare	26,765	29,478	11,911	16,092	8,784	10,429	*104,484
Tuolumne	1,773	8,415	2,040	2,977	1,531	1,223	*18,659
Ventura	2,666	5,887	2,139	2,442	2,095	10,850	*29,929
Yolo	7,197	3,761	2,654	2,649	1,194	1,522	18,977
Yuba	2,255	4,773	1,628	1,827	1,152	1,959	13,594
Totals	467,332	576,909	218,480	267,799	163,728	321,984	2,077,025

*Includes animals, age or sex not specified.

TABLE XIII.

Sheep, Lambs, and Swine, by Counties, 1910.

Counties	Rams, ewes and wethers	Spring lambs	Total	Mature hogs	Spring pigs	Total
Alameda	5,680	3,507	9,187	3,640	2,770	6,410
Alpine	9,832	6,808	16,640	309	208	517
Amador	3,919	2,726	6,645	3,623	1,673	5,296
Butte	29,137	15,940	45,077	9,317	5,016	14,333
Calaveras	10,145	5,215	15,360	2,588	1,586	4,174
Colusa	39,801	24,791	64,592	17,646	10,418	28,064
Contra Costa	14,132	5,463	19,595	3,887	3,054	6,941
Del Norte	1,341	500	1,841	1,153	617	1,770
El Dorado	1,763	1,399	3,162	1,428	973	2,401
Fresno	94,757	47,254	142,011	20,134	13,016	33,150
Glenn	70,210	41,153	111,363	12,483	5,827	18,310
Humboldt	62,423	24,650	87,073	7,688	4,945	12,633
Imperial	13,786	9,553	23,339	45,764	24,798	70,562
Inyo	17,240	26,106	43,346	1,795	1,560	3,355
Kern	19,801	10,516	30,317	13,376	7,137	20,513
Kings	40,483	21,891	62,374	22,775	17,858	40,633
Lake	7,436	3,511	10,947	5,301	2,737	8,038
Lassen	42,490	30,225	72,725	3,079	1,955	5,034
Los Angeles	22,261	8,830	31,091	18,418	10,524	28,942
Madera	6,269	3,837	10,106	4,444	2,409	6,853
Marin	1,930	1,025	2,955	8,812	7,287	16,099
Mariposa	877	304	1,181	6,160	2,722	8,882
Mendocino	88,760	41,010	129,770	14,600	7,469	22,069
Merced	28,044	11,724	39,768	19,414	10,121	29,535
Modoc	46,078	30,484	76,562	5,328	3,160	8,488
Mono	40,805	22,241	63,046	179	244	423
Monterey	17,029	11,845	28,874	12,567	7,464	20,031
Napa	5,794	5,084	10,878	5,160	3,184	8,344
Nevada	6,853	4,309	11,162	1,067	749	1,816
Orange	31,802	11.876	43,678	2,265	2,183	4,448
Placer	15,142	9,326	24,468	1,822	1,565	3,387
Plumas	845	314	1,159	665	744	1,409
Riverside	5,589	1,420	7,009	3,892	2,258	6,150
Sacramento	25,828	21,129	46,957	6,421	4,034	10,455
San Benito	10,635	4,511	15,146	5,572	2,560	8,132
San Bernardino	7	----------	7	2,562	1,187	3,749
San Diego	220	69	289	4,261	3,130	7,391
San Francisco	3	----------	3	181	100	281
San Joaquin	14,807	10,012	24,819	13,473	9,981	23,454
San Luis Obispo	54,717	32,236	86,953	11,750	6,118	17,868
San Mateo	767	562	1,329	8,692	3,990	12,682
Santa Barbara	60,205	20,328	80,533	15,113	6,960	22,073
Santa Clara	4,449	5,606	10,055	4,165	3,184	7,349
Santa Cruz	876	703	1,579	2,165	1,509	3,674
Shasta	11,449	5,574	17,023	12,832	5,968	18,800
Sierra	3,005	93	3,098	370	294	664
Siskiyou	18,013	11,909	29,922	6,116	3,396	9,512
Solano	96,921	73,232	170,153	8,836	4,732	13,568
Sonoma	44,095	21,220	65,315	10,995	7,428	18,423
Stanislaus	15,874	7,378	23,252	13,610	9,417	23,027
Sutter	51,135	38,530	89,665	9,121	6,008	15,129
Tehama	185,023	112,713	297,736	10,915	4,025	14,940
Trinity	2,732	1,081	3,813	2,594	1,457	4,051
Tulare	14,014	7,170	21,184	23,942	14,250	38,192
Tuolumne	1,795	671	2,466	2,590	1,303	3,893
Ventura	16,113	15,658	31,771	6,984	3,514	10,498
Yolo	49,807	29,639	79,446	15,483	8,714	24,197
Yuba	40,344	27,318	67,662	3,288	2,251	5,539
Totals	1,525,288	892,189	2,417,477	482,810	283,741	766,551

TABLE XIV.

Wool Produced by Counties, 1860-1900.

(Compiled from reports of the Census Bureau.)

(Pounds.)

Counties	1860	1870	1880	1890	1900
Alameda	284,735	138,975	205,955	156,065	148,810
Alpine	-----------	281,700	90	2,015	6,480
Amador	20,650	73,010	64,808	53,879	30,385
Butte	92,400	351,023	323,483	307,739	551,590
Calaveras	10,335	129,025	161,351	130,761	120,090
Colusa	66,900	1,086,599	661,782	603,822	113,040
Contra Costa	74,108	58,800	27,293	92,415	20,900
Del Norte	-----------	3,471	6,462	7,524	3,520
El Dorado	1,130	50,096	73,233	2,251	980
Fresno	-----------	191,594	1,477,000	1,802,043	425,862
Glenn	-----------	-----------	-----------	-----------	328,020
Humboldt	-----------	51,867	647,492	997,649	948,970
Imperial	-----------	-----------	-----------	-----------	-----------
Inyo	-----------	-----------	35,382	139,252	264,290
Kern	-----------	281,100	666,427	1,163,056	792,700
Kings	-----------	72	-----------	-----------	678,630
Lake	-----------	58,046	185,418	139,584	41,940
Lassen	-----------	75	92,748	152,232	269,180
Los Angeles	209,869	962,603	1,499,895	544,660	244,380
Madera	-----------	-----------	-----------	-----------	279,810
Marin	17,820	6,692	2,080	153	2,947
Mariposa	-----------	87,816	163,896	225,895	15,290
Mendocino	18,794	178,493	990,264	1,048,020	1,089,490
Merced	28,500	231,072	631,725	984,505	712,310
Modoc	-----------	-----------	71,378	86,499	310,725
Mono	-----------	7,000	350	15,888	176,520
Monterey	485,167	1,054,310	523,612	267,247	56,100
Napa	31,390	20,789	157,085	156,368	17,810
Nevada	-----------	-----------	8,002	6,816	15,750
Orange	-----------	-----------	-----------	1,110,112	293,620
Placer	31,330	169,033	233,901	439,723	145,810
Plumas	-----------	13,023	23,608	5,833	27,290
Riverside	-----------	-----------	-----------	-----------	76,650
Sacramento	67,005	515,213	509,834	254,263	227,900
San Benito	-----------	-----------	323,285	128,247	59,740
San Bernardino	4,000	71,075	250,338	176,100	38,574
San Diego	5,150	9,250	811,308	130,180	91,040
San Francisco	-----------	-----------	-----------	-----------	-----------
San Joaquin	36,477	86,700	466,960	111,585	176,160
San Luis Obispo	260,100	903,863	643,853	146,740	77,800
San Mateo	7,535	12,625	2,819	4,040	4,510
Santa Barbara	150,200	996,200	692,415	71,600	509,250
Santa Clara	19,000	179,465	73,024	1,103	15,920
Santa Cruz	24,875	3,100	3,640	3,760	4,410
Shasta	-----------	15,820	88,142	68,164	126,900
Sierra	-----------	-----------	3,625	-----------	8,310
Siskiyou	1,150	43,858	135,164	62,024	85,920
Solano	240,937	306,817	290,996	208,385	412,140
Sonoma	78,223	230,394	664,721	547,120	335,010
Stanislaus	38,249	749,263	787,516	176,807	216,990
Sutter	83,062	126,657	152,367	181,489	305,150
Tehama	32,675	445,456	484,763	1,408,818	1,648,750
Trinity	-----------	-----------	80,115	64,189	62,290
Tulare	16,900	660,645	460,080	1,112,091	355,142
Tuolumne	150	48,525	58,535	39,170	9,930
Ventura	-----------	-----------	728,932	281,504	10,000
Yolo	146,806	437,048	276,721	280,977	456,870
Yuba	97,487	63,425	194,163	258,155	232,960
Totals	2,683,109	11,391,743	*16,798,036	†16,358,547	13,680,495

*Exclusive of wool obtained from range sheep.

†In a summary issued in 1900, the total wool produced is stated at 24,092,954 pounds.

TABLE XV.

Goats, Wool, Mohair, and Goat Hair, 1900-1910.

(Compiled from the Reports of the Census Bureau.)

Counties	Number of goats, 1900	Number of goats, 1910	Number of wool fleeces shorn, 1910	Mohair and goat hair fleeces shorn, 1910	Value of wool and mohair produced, 1910
Alameda	66	64	5,783	------------	$4,930
Alpine	------------	10	6,790	------------	9,561
Amador	1,584	1,597	7,253	449	5,882
Butte	1,562	3,215	38,261	1,749	33,991
Calaveras	1,142	3,348	15,677	517	11,551
Colusa	4,289	2,154	73,221	4,009	56,620
Contra Costa	79	17	14,715	------------	10,869
Del Norte	------------	465	1,238	40	2,070
El Dorado	591	3,315	3,808	933	3,504
Fresno	517	4,558	107,802	1,900	109,982
Glenn	4,571	2,813	131,612	5,177	101,749
Humboldt	920	3,747	85,212	2,540	104,430
Imperial	------------	147	12,755	26	17,067
Inyo	8,382	2,846	17,847	505	27,761
Kern	3,364	930	24,177	355	26,540
Kings	870	507	73,393	26	58,836
Lake	10,512	9,018	10,372	6,603	12,922
Lassen	45	586	36,768	2,088	55,154
Los Angeles	13,580	8,238	31,754	230	32,366
Madera	83	278	4,905	60	2,272
Marin	25	147	2,823	------------	2,816
Mariposa	1,026	931	355	154	376
Mendocino	3,627	3,927	149,260	2,315	158,918
Merced	1,878	5,246	46,908	8,400	39,400
Modoc	1,280	549	39,538	1,356	55,583
Mono	651	25	29,160	------------	41,209
Monterey	3,127	3,983	24,884	3,000	26,549
Napa	632	556	9,955	153	7,196
Nevada	989	2,198	10,607	1,043	8,382
Orange	396	423	62,072	------------	51,474
Placer	945	1,542	28,841	177	21,728
Plumas	23	10	593	------------	767
Riverside	384	924	1,536	13	2,600
Sacramento	67	89	41,103	7	35,449
San Benito	139	489	19,457	33	18,974
San Bernardino	126	81	------------	------------	------------
San Diego	2,290	1,147	155	60	195
San Francisco	19	9	3	------------	4
San Joaquin	132	260	20,477	37	14,114
San Luis Obispo	1,502	7,390	64,719	4,758	52,868
San Mateo	363	154	1,013	26	1,162
Santa Barbara	1,118	558	27,787	68	26,308
Santa Clara	5,143	163	4,765	------------	3,596
Santa Cruz	1,505	1,043	799	630	1,444
Shasta	8,792	18,403	17,862	11,606	25,705
Sierra	104	73	2,333	------------	3,940
Siskiyou	3,772	384	14,975	134	23,038
Solano	56	392	157,499	3	161,312
Sonoma	1,544	2,991	75,925	2,330	74,951
Stanislaus	159	217	22,837	50	22,700
Sutter	173	511	149,821	800	110,738
Tehama	10,667	28,473	336,373	36,119	349,689
Trinity	108	845	2,603	44	1,892
Tulare	1,190	2,979	33,150	510	35,218
Tuolumne	1,119	1,609	1,408	177	996
Ventura	1,022	621	21,465	400	14,306
Yolo	322	716	82,602	316	76,497
Yuba	298	502	63,383	208	45,777
Indian reservation	151	------------	------------	------------	------------
Totals	109,021	138,413	2,275,389	102,134	$2,205,928

Goat Hair and Mohair: 1909 and 1899. Although 1,714 farmers reported 138,413 goats and kids on their farms April 15, 1910, only 367 reported the production of goat hair or mohair during 1909. These farmers reported 102,134 fleeces, weighing 282,596 pounds and valued at $60,821. The production showed a considerable increase between 1899 and 1909. Many farmers who have goats do not produce goat hair or mohair, but it is believed that the report is somewhat short of the actual production.

TABLE XVI.

Counties	Domestic animals on farms and				
	Horses and colts	Cattle	Mules and colts	Asses and burros	Swine (all ages)
Alameda	10,644	24,319	227	3	6,410
Alpine	426	2,754	18	14	517
Amador	2,685	22,266	239	23	5,296
Butte	7,655	*26,584	1,961	18	14,333
Calaveras	3,648	20,977	63	27	4,174
Colusa	4,732	*18,750	5,291	65	28,064
Contra Costa	11,233	26,529	651	6	6,941
Del Norte	441	6,857	3	----------	1,770
El Dorado	2,544	13,048	112	17	2,401
Fresno	25,009	127,625	3,979	101	33,150
Glenn	*3,946	*16,214	3,362	29	18,310
Humboldt	6,403	*53,775	189	11	12,633
Imperial	7,229	*22,741	1,672	56	70,562
Inyo	5,032	20,308	337	309	3,355
Kern	*10,347	*118,320	1,248	130	20,513
Kings	11,473	74,975	1,069	23	40,633
Lake	2,492	7,414	263	10	8,038
Lassen	9,515	43,832	702	119	5,034
Los Angeles	22,424	43,095	2,570	84	28,942
Madera	4,070	*27,905	3,141	49	6,853
Marin	2,558	*39,266	11	----------	16,099
Mariposa	2,240	*16,671	296	83	8,882
Mendocino	5,994	30,154	309	29	22,069
Merced	12,556	*150,467	4,075	107	29,535
Modoc	*15,636	46,916	1,132	98	8,488
Mono	2,097	5,301	136	62	423
Monterey	*17,444	*88,889	642	26	20,031
Napa	5,910	*15,866	372	10	8,344
Nevada	*2,074	8,606	68	10	1,816
Orange	10,565	18,220	2,268	25	4,448
Placer	4,193	*7,510	498	66	3,387
Plumas	2,044	11,401	43	5	1,409
Riverside	10,315	19,468	1,429	88	6,150
Sacramento	9,969	*31,188	743	19	10,455
San Benito	8,475	*39,703	96	29	8,132
San Bernardino	6,878	12,761	778	88	3,749
San Diego	11,498	58,777	766	181	7,391
San Francisco	319	2,510	----------	----------	281
San Joaquin	*20,972	31,296	3,530	62	23,454
San Luis Obispo	15,274	*118,704	877	19	17,868
San Mateo	4,295	15,288	12	2	12,682
Santa Barbara	13,034	*87,576	443	24	22,073
Santa Clara	15,816	*46,030	274	11	7,349
Santa Cruz	4,290	10,100	88	6	3,674
Shasta	5,217	34,119	294	23	18,800
Sierra	1,394	7,787	20	4	664
Siskiyou	9,150	*45,079	503	22	9,512
Solano	8,050	21,784	2,319	23	13,568
Sonoma	13,728	*48,727	398	28	18,423
Stanislaus	*14,357	*49,132	5,442	31	23,027
Sutter	5,684	*16,604	2,096	20	15,129
Tehama	5,876	25,309	1,675	23	14,940
Trinity	1,306	11,885	168	8	4,051
Tulare	*22,200	*104,484	3,655	103	38,192
Tuolumne	2,491	*18,659	91	26	3,893
Ventura	*11,480	*29,929	2,362	60	10,498
Yolo	8,315	18,977	3,955	46	24,197
Yuba	3,244	13,594	800	31	5,539
Totals	*468,886	*2,077,025	69,761	2,592	766,551

* Including animals, age or sex not specified.

SUMMARY.

ranges, 1910		Domestic animals in inclosures (not on farms), 1910				
Sheep—rams, ewes, wethers and lambs	Goats	Cattle	Horses	Mules, asses and burros	Swine	Sheep and goats
9,187	64	2,938	11,439	289	429	3,065
16,640	10	7	16	2	5	22
6,645	1,597	303	492	34	56	-----
45,077	3,215	686	1,835	16	201	23
15,360	3,348	1,056	746	22	107	32
64,592	2,154	479	726	291	172	131
19,595	17	726	1,378	48	103	92
1,841	465	75	114	1	1	-----
3,162	3,315	709	473	20	137	-----
142,011	4,558	1,428	4,525	674	341	58
111,363	2,813	313	694	115	43	5
87,073	3,747	1,363	1,549	20	1,132	165
23,339	147	244	1,278	559	878	435
43,346	2,846	315	902	761	140	16,111
30,317	930	820	3,565	1,482	108	7,597
62,374	507	243	1,005	24	124	5
10,947	9,018	365	395	24	193	34
72,725	586	7,528	25,297	3,425	807	3,025
31,091	8,238	313	743	26	87	18,064
10,106	278	155	436	76	30	1
2,955	147	361	1,227	81	1	26
1,181	931	42	256	75	-----	-----
129,770	3,927	806	1,280	27	348	4
39,768	5,246	130	520	30	69	11,028
76,562	549	433	811	21	156	-----
63,016	25	65	170	16	-----	-----
28,874	3,983	505	1,535	112	53	7
10,878	556	251	899	14	38	91
11,162	2,198	799	946	36	350	89
43,678	423	885	1,923	179	90	649
24,468	1,542	1,076	1,442	162	252	78
1,159	10	162	451	14	79	6
7,009	924	1,163	2,815	249	131	2,833
46,957	89	646	3,917	74	164	80
15,146	489	148	407	4	20	-----
7	81	1,671	2,977	757	409	1,324
289	1,147	1,210	3,303	434	15	118
3	9	2,280	21,184	320	1,243	2,924
24,819	260	840	2,405	67	150	84
86,953	7,390	1,144	1,301	18	52	18
1,329	154	913	1,424	23	964	114
80,533	558	1,010	2,801	73	40	61
10,055	163	1,105	5,156	66	125	116
1,579	1,043	536	1,543	66	65	79
17,023	18,403	948	1,274	60	486	529
3,098	73	180	312	55	35	42
29,922	384	745	1,393	130	229	28
170,153	392	579	1,108	19	24	31
65,315	2,991	959	2,166	23	164	27
23,252	217	653	1,454	99	157	3
89,665	511	387	386	19	83	1,903
297,736	28,473	273	568	6	35	12
3,813	845	508	277	48	106	-----
21,184	2,979	831	1,765	137	100	16
2,466	1,609	740	923	108	319	473
31,771	621	576	1,374	93	280	41
79,446	716	371	834	30	195	43
67,662	502	179	386	15	47	2
2,417,477	138,413	46,176	132,521	11,669	12,168	71,744

POULTRY.

With the exception of the turkey, all the different species of poultry now kept on American farms are of European or Asiatic origin. The fowl, or chicken, is unquestionably of Asiatic origin.

VARIETIES.

The chickens of the United States may be divided into ten classes:

The American class includes the—
- Plymouth Rock.
- Wyandotte.
- Java.
- American Dominique.
- Jersey Blue.

The Asiatic class—
- Brahma.
- Cochin.
- Langshans.

The Mediterranean class—
- Leghorn.
- Minorca.
- Andalusian.
- Spanish.

The Polish class—
- White Crested.
- Black.
- Golden.
- Silver.
- White and Bearded Golden.
- Bearded White.
- Bearded Silver.
- Buff Laced.

The Dutch or Hamburg class—
- Hamburgs.
- Red Caps.
- Campines.

French class—
- Houdans.
- Crevecœurs.
- La Fleche.

Game and Game Bantam class—
- Black-breasted Red.
- Brown Red.
- Golden and Silver Duckwing.
- Red Pyle.
- White, Black, Birchen, Cornish, and Indian Games.
- Malays.

Bantams other than Game—
- Bebrights.
- Rose Combed.
- Booted.
- White.
- Cochin.
- Japanese.
- Polish.

English class—
- Dorkings.
- Orpingtons.

Miscellaneous class—
- Russian.
- Sumatra.
- Silky.
- Sultan.
- Frizzles.
- Rumples.
- Yokohama.
- Naked Neck.

Classified according to their prominent characteristics, they may be divided into four classes. The egg breeds, which are the greatest egg producers, are the Leghorns, Spanish, Minorcas, and Hamburgs.

The meat breeds, whose chief value is as meat producers: Brahma, Cochin, and Langshan. The general utility fowls furnish fair quantities of eggs and meat. The Plymouth Rock and Wyandotte belong to this class.

The fancy breeds are reared chiefly on account of their appearance: the Polish, Games, Bantams, and some miscellaneous breeds are the chief representatives of this class.

For general purposes the Plymouth Rock and Wyandotte are the most popular of all fowls, the Plymouth Rock in particular being in great favor.

The turkey is an American bird. The wild turkey was once found all along the Atlantic coast, throughout Mexico, Central America, and the great interior plains of North America. The recognized varieties of the domestic turkey are the Bronze, Narragansett, White, Holland, Buff, Slate, and Black.

DUCKS.

The six leading varieties are the White Pekin, White Aylesbury, Colored Rouen, Black Cayuga, Colored Muscovy, and White Muscovy.

The most prominent breeds of geese are the Toulouse, African, Embden, Chinese, Wild, and Egyptian.

The raising of poultry in California is carried on successfully and on a large scale, the center of this industry being at Petaluma, in Sonoma County.

THE OSTRICH INDUSTRY.*

In January, 1910, there were at least 6,100 breeding or feather-producing ostriches in this country, of which Arizona had 80 per cent, California 17 per cent, Arkansas 2 per cent, the small remainder being in Texas and Florida. There are ostrich farms at Pasadena, Sacramento, and Brawley in Imperial County.

The question of the nature of the country most favorable for ostriches is largely affected by the kind of vegetation peculiarly suited to the soil, which in turn is undoubtedly affected by the amount of rainfall. Alfalfa pasture makes an ideal run for the birds, furnishing a large percentage of their food; hence a soil which is or can be made suitable for alfalfa is one of the essentials to success in ostrich farming. A dry, sandy soil, made suitable by drainage and irrigation for raising alfalfa, has proved best adapted to successful ostrich farming. Such a soil is generally peculiarly adapted for raising large crops of alfalfa, and makes an ideal soil for an alfalfa pasture. Under such conditions, it is essential to have some shade.

The demand for information concerning ostriches indicates that the number of individuals who are interested in ostrich farming is rapidly increasing.

The profit to be derived from the business will depend on the management, on the success secured in the raising of the young birds, and on the production of feathers of good quality. The average yearly yield of feathers from an ostrich is 1¼ pounds. Birds produce from 12 to 20 ounces of feathers at each plucking, with an average of 16 ounces.

There were nine ostrich farms, returning 974 ostriches valued at $224,000. There were also reported peafowls valued at $1,431, pheasants valued at $342, and India Jungle fowls valued at $150. The number of farms reporting poultry increased 10,772 since 1900.

Poultry in California, 1880-1910.

	1880	1890	1900	1910	Value 1910
Chickens	1,425,991	3,504,251	3,947,200	5,665,964	$3,237,049
Turkeys		287,799	158,356	116,602	258,033
Ducks		157,514	62,293	40,061	28,325
Geese		37,659	28,419	14,195	18,609
Guinea fowls			[1]	2,920	1,993
Pigeons			[2]	246,065	69,254
Ostriches			198	1,082	229,340
All other fowls	184,176	482,972	249,068	378	1,923
Totals	1,610,167	4,470,195	4,196,466	6,087,267	$3,844,526

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[1] Included with chickens. [2] Not reported.

*For further details regarding the Ostrich industry, see the Statistical Report of the State Board of Agriculture for 1913.

Eggs.*

The production of eggs in California in 1909 was 41,022,000 dozen, valued at $10,263,000.

Number of eggs—	Dozens	Value
In 1899	24,443,540	$3,864,679
In 1909	41,022,395	10,262,694
Increase 1889 to 1909	16,578,855	6,398,015
Per cent of increase	67.8	165.6

*The center of the poultry industry in California is at Petaluma, in Sonoma County

TABLE XVII.

Poultry and Eggs, 1909-1910.

Counties	Number of poultry raised in 1909	Number of poultry in 1910	Dozens of eggs produced in 1909
Alameda	230,417	240,914	1,391,728
Alpine	2,547	2,159	8,904
Amador	23,628	23,630	142,824
Butte	94,183	74,982	377,598
Calaveras	31,410	23,242	107,387
Colusa	73,034	61,113	249,229
Contra Costa	154,332	118,944	664,951
Del Norte	3,357	3,911	13,767
El Dorado	28,499	24,308	132,910
Fresno	266,221	213,108	1,267,840
Glenn	67,529	50,336	252,286
Humboldt	67,310	54,834	332,115
Imperial	84,062	72,252	264,826
Inyo	50,007	30,132	146,952
Kern	89,520	75,900	394,130
Kings	153,839	102,747	687,052
Lake	37,976	27,435	135,001
Lassen	28,907	19,297	106,897
Los Angeles	586,566	513,965	2,332,397
Madera	28,137	23,246	67,932
Marin	141,629	203,277	1,465,911
Mariposa	19,583	12,217	49,728
Mendocino	64,935	56,807	337,781
Merced	136,305	83,998	454,115
Modoc	38,112	23,789	134,731
Mono	2,559	2,515	4,541
Monterey	123,743	128,325	751,177
Napa	105,428	108,777	662,159
Nevada	35,776	23,482	150,596
Orange	239,536	186,746	1,198,290
Placer	62,151	43,619	235,606
Plumas	15,163	9,649	48,511
Riverside	95,767	84,226	438,099
Sacramento	144,704	116,556	666,906
San Benito	79,550	95,289	696,264
San Bernardino	105,606	91,098	579,685
San Diego	174,778	130,158	921,117
San Francisco	196,020	42,649	110,057
San Joaquin	212,434	175,456	955,501
San Luis Obispo	109,871	119,822	840,405
San Mateo	43,946	47,625	236,642
Santa Barbara	91,159	89,995	407,168
Santa Clara	233,729	209,093	1,166,782
Santa Cruz	79,015	85,705	577,989
Shasta	52,607	35,873	199,858
Sierra	6,993	4,458	24,877
Siskiyou	57,444	43,413	254,107
Solano	66,403	74,683	426,261
Sonoma	1,512,601	1,362,399	9,470,880
Stanislaus	121,677	128,905	648,248
Sutter	101,908	68,861	420,198
Tehama	96,134	59,852	306,452
Trinity	10,800	7,712	31,776
Tulare	204,167	191,965	1,033,110
Tuolumne	22,710	15,989	94,507
Ventura	61,703	60,921	372,111
Yolo	84,010	76,972	347,209
Yuba	44,202	27,936	111,892
Totals	7,096,339	6,087,267	35,907,973

DAIRY PRODUCTS.

Dairy products in general are somewhat less accurately reported than the principal crops. This is particularly the case as regards the quantity of milk produced. Less than one-third of the milk produced was sold as such. Large quantities of milk and cream were sold on the butter fat basis. The butter made on farms in 1909 was valued at $4,086,000.

Dairy Products and Their Value.

(From report of Census Bureau.)

Dairy cows and products	Number	Value
Dairy cows on farms, April, 1910	467,332 head	
On farms reporting dairy products in 1909	408,812 head	
On farms reporting milk produced in 1909	315,385 head	
Specified dairy products, 1909:		
Milk	154,901,956 gals.	
Butter	15,301,871 lbs.	$4,085,992
Cheese	2,777,873 lbs.	383,494
Milk sold	45,333,432 gals.	7,346,176
Cream sold	3,397,061 gals.	2,861,921
Butter fat sold	19,176,719 lbs.	5,766,394
Butter sold	10,285,583 lbs.	2,763,392
Cheese sold	2,513,815 lbs.	345,414
Total receipts from sales, 1909		$19,083,297
Total value of milk, cream, and butter fat sold, and butter and cheese made		$20,443,977

CHEESE AND BUTTER.

The production of cheese and butter, as given by counties by the Census Bureau, is that made on farms only. The production by creameries in 1909 was 37,283,450, and full cream cheese 1,567,640 pounds. The decrease from 1904, when it amounted to 3,601,051, is, no doubt, due in part to the increasing practice of separating the cream on the farm, as it is now more profitable to sell the separated cream to the butter factories. The figures issued by the State Dairy Bureau are also given. The cheese produced is, with a few exceptions, only that made by the ordinary Cheddar process. There is a considerable amount of fancy and handmade cheese which has not been reported. That the production of cheese in the State is far below the demand, is proved by the fact that more than double the amount manufactured in this State is received in the San Francisco market alone. We have the finest land for pasture and conditions favorable for the production of this article.

The amount of the output of cheese reported is much below the actual production in the State, and it is impossible to estimate it, as the owners of factories constantly change from making cheese to the production of cream. It has never been attempted to get a report on other than that made by the ordinary Cheddar process.

TABLE XVIII.

Butter and Cheese Produced on Farms. 1910.*

(Compiled from the returns of the Bureau of the Census.)

(Pounds.)

Counties	1889		1899		1909	
	Butter	Cheese	Butter	Cheese	Butter	Cheese
Alameda	509,614	62,132	526,978	6,716	252,603	675
Alpine	25,075	110	12,495	-----------	28,613	500
Amador	168,436	4,395	91,584	5,184	68,812	32,517
Butte	178,329	1,143	149,200	40	124,437	-----------
Calaveras	35,546	550	66,946	1,155	51,841	2,787
Colusa	177,100	100	107,222	-----------	75,829	272
Contra Costa	315,181	27,802	449,511	21,046	226,976	9,790
Del Norte	455,960	-----------	300,990	-----------	461,303	-----------
El Dorado	216,790	9,125	162,072	9,200	176,354	3,734
Fresno	382,744	11,370	609,676	122,058	514,946	41,210
Glenn	-----------	-----------	-----------	-----------	86,762	-----------
Humboldt	1,922,282	9,712	791,850	81	475,773	-----------
Imperial	-----------	-----------	-----------	-----------	71,581	1,400
Inyo	55,316	3,373	47,813	185	116,364	5,426
Kern	104,633	88,850	142,392	12,403	73,839	30,051
Kings	-----------	-----------	145,704	2,575	78,295	139,000
Lake	119,349	350	121,186	102	92,723	200
Lassen	200,691	5,650	235,258	69,763	279,685	160
Los Angeles	676,575	250,890	509,757	5,243	323,374	1,643
Madera	-----------	-----------	-----------	-----------	48,459	-----------
Marin	3,928,009	3,000	3,234,320	4,870	2,289,217	101,743
Mariposa	21,158	695	35,760	196	12,753	-----------
Mendocino	375,445	22,000	349,840	3,924	355,048	1,357
Merced	153,467	4,420	138,243	98,595	94,602	200,840
Modoc	142,057	10,150	127,930	-----------	153,175	3,680
Mono	55,093	870	29,832	1,325	30,202	-----------
Monterey	1,743,162	101,600	712,845	559,923	286,450	59,680
Napa	405,587	43,070	395,494	51,260	381,930	35,826
Nevada	147,042	100	119,236	-----------	158,271	1,970
Orange	295,146	3,480	220,218	938	333,283	50
Placer	195,507	520	217,508	-----------	108,876	30,545
Plumas	531,549	15,378	474,599	30,170	237,330	2,500
Riverside	-----------	-----------	298,345	208	312,248	650
Sacramento	725,404	230,455	551,020	543,356	164,427	497,064
San Benito	215,545	572,262	223,333	124,351	74,131	137,685
San Bernardino	303,420	1,460	249,439	-----------	207,745	362
San Diego	408,915	4,472	448,076	7,204	575,662	2,895
San Francisco	7,805	200	104,150	10	144	-----------
San Joaquin	326,880	1,755	351,312	3,713	341,820	93,630
San Luis Obispo	3,322,918	417,791	1,286,289	135,023	1,369,563	169,350
San Mateo	655,008	521,936	349,421	509,714	91,997	64,751
Santa Barbara	1,055,380	94,235	821,804	57,773	244,632	25,665
Santa Clara	351,248	491,876	484,856	514,563	320,236	577,350
Santa Cruz	425,071	383,165	405,504	372,749	224,392	227,905
Shasta	111,484	6,000	122,610	148	137,723	-----------
Sierra	123,598	170	114,546	-----------	135,938	1,318
Siskiyou	312,814	27,000	279,776	35,065	254,999	39,470
Solano	579,422	650	505,128	2,364	381,903	873
Sonoma	2,971,664	234,000	2,093,892	121,695	1,192,532	211,319
Stanislaus	143,231	25,160	153,026	228,363	154,998	2,125
Sutter	160,612	45.300	151,809	249,638	183,527	-----------
Tehama	125,425	430	160,711	7,599	182,953	-----------
Trinity	15,509	-----------	34,433	-----------	46,277	-----------
Tulare	354,368	35,738	329,018	1,407	201,880	16,850
Tuolumne	27,716	525	60,150	60	35,522	155
Ventura	226,792	84,840	270,109	624	267,905	-----------
Yolo	195,879	-----------	233,345	326,706	88,338	-----------
Yuba	93,153	11,320	83,695	-----------	40,673	900
Totals	26,776,704	3,871,575	20,853,360	4,249,588	15,301,871	2,777,873

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*This is made on farms, and does not include the amount made in creameries or factories, which is very much larger.

SUMMARY OF BUTTER AND CHEESE PRODUCED ON FARMS.

(Compiled from the returns of the Bureau of the Census.)

Butter, 1850-1910.

Year	Made on farms (pounds)	Made in factories (pounds)	Total (pounds)
1850	705	------------	705
1860	3,095,035	------------	3,095,035
1870	7,969,744	------------	7,969,744
1880	14,084,405	2,074,344	16,158,749
1890	26,776,704	271,767	27,048,471
1900	20,853,360	13,147,137	34,000,497
1910	15,301,871	37,283,450	52,585,321

Cheese, 1850-1910.

Year	Made on farms (pounds)	Made in factories (pounds)	Total (pounds)
1850	150	------------	150
1860	1,343,689	------------	1,343,689
1870	3,395,074	------------	3,395,074
1880	2,566,618	1,154,121	3,720,739
1890	3,871,575	1,091,222	4,962,797
1900	4,249,588	2,676,543	6,926,131
1910	2,777,873	1,567,640	4,345,513

TABLE XIX.

Production of Butter and Cheese in California, 1914-1915.

(Compiled from the returns of the State Dairy Bureau. For year ending September 30, 1915.)

Counties	1914		1915	
	Butter (pounds)	Cheese (pounds)	Butter (pounds)	Cheese (pounds)
Alameda	316,912	------------	437,401	------------
Alpine	25,000	------------	27,000	------------
Amador	140,000	10,272	114,890	13,688
Butte	924,616	93,000	1,124,710	79,200
Calaveras	155,000	------------	133,197	------------
Colusa	473,938	25,944	566,512	32,400
Contra Costa	545,095	------------	621,575	------------
Del Norte	664,186	------------	887,500	------------
El Dorado	125,660	------------	127,958	------------
Fresno	3,292,572	169,546	3,158,220	445,945
Glenn	770,202	------------	1,258,020	------------
Humboldt	5,251,887	386,000	5,591,870	344,350
Imperial	5,710,287	185,000	6,334,316	61,000
Inyo	171,241	------------	303,309	------------
Kern	986,457	36,275	982,694	43,750
Kings	3,164,620	54,750	3,811,477	------------
Lake	114,124	------------	101,953	------------
Lassen	202,200	115,519	220,000	113,988
Los Angeles	534,180	55,050	567,621	200
Madera	162,636	------------	462,501	------------
Marin	2,046,325	558,630	2,338,338	476,180
Mariposa	------------	------------	------------	------------
Mendocino	447,049	------------	498,779	144,000
Merced	3,876,875	190,020	4,253,000	142,375
Modoc	25,000	70,394	85,534	168,665
Mono	10,000	8,000	10,000	12,000
Monterey	660,715	728,111	939,483	800,789
Napa	665,151	26,000	600,439	26,087
Nevada	162,920	------------	241,689	------------
Orange	75,000	------------	74,000	------------
Placer	105,000	------------	128,904	------------
Plumas	295,598	------------	320,886	2,800
Riverside	141,720	------------	245,270	8,500
Sacramento	1,649,153	542,330	1,737,511	427,065
San Benito	275,857	269,577	438,386	202,484
San Bernardino	105,000	------------	100,000	------------
San Diego	573,929	------------	593,384	------------
San Francisco	15,750	------------	------------	------------
San Joaquin	1,292,474	108,747	1,184,658	117,302
San Luis Obispo	1,909,176	246,090	2,759,751	134,662
San Mateo	211,000	204,175	327,448	152,690
Santa Barbara	331,148	10,000	510,460	------------
Santa Clara	299,750	768,101	309,552	1,089,288
Santa Cruz	183,902	218,292	274,439	228,169
Shasta	91,620	45,407	123,000	------------
Sierra	145,000	------------	150,000	4,000
Siskiyou	788,975	26,894	880,013	72,480
Sonoma	2,449,695	206,736	2,965,893	271,753
Solano	1,464,456	------------	1,043,303	------------
Stanislaus	8,184,390	71.500	9,973,320	67.200
Sutter	881,805	368,860	969,594	158,735
Tehama	504,975	27,992	473,733	1,000
Trinity	------------	------------	------------	------------
Tulare	4,362,290	54,100	4,787,690	54,000
Tuolumne	------------	------------	------------	------------
Ventura	56,937	------------	34,588	------------
Yolo	1,061,703	16,903	1,091,496	6,030
Yuba	198,309	118,000	252,164	147,000
Totals	59,286,460	6,016,815	67,522,409	6,249,775

Summary of Butter, Cheese, and Condensed Milk Production, 1905-1915.

(Compiled from the reports of the State Dairy Bureau.)

Year	Butter, pounds	Cheese, pounds	Condensed milk, cases
1905	41,961,047	6,020,672	244,878
1906	44,044,578	6,418,480	113,025
1907	44,599,211	5,928,942	134,907
1908	48,469,585	6,262,194	100,069
1909	43,899,018	4,431,194	83,476
1910	45,989,141	4,648,348	172,916
1911	50,380,736	4,580,495	116,384
1912	54,940,886	4,785,617	172,309
1913	55,542,709	5,600,972	172,800
1914	59,286,460	6,016,815	274,096
1915	67,522,409	6,105,775	345,402

Receipts of Butter in San Francisco, 1905-1915.

Year	Pounds
1905	17,936,782
1906	*
1907	15,384,137
1908	14,610,522
1909	14,328,000
1910	13,934,200
1911	19,033,600
1912	23,548,850
1913	23,905,100
1914	22,580,950
1915	27,323,500

*Not available.

Annual Value of Dairy Products, 1914-1915.

Products	Value
1914—	
Butter, 59,286,460 pounds	$16,368,992
Cheese, 6,016,815 pounds	950,055
Condensed, evaporated and powdered milk, 14,153,401 pounds	1,076,300
Casein, 992,917 pounds	46,146
Market milk, cream and ice cream	11,500,000
Calves produced on dairies	2,500,000
Skim milk and buttermilk	1,500,000
Total	$33,941,493
1915—	
Butter, 67,522,409 pounds	$19,378,932
Cheese, 6,105,775 pounds	860,914
Condensed, evaporated and powdered milk, 16,579,317 pounds	1,352,959
Casein, 690,750 pounds	34,537
Market milk, cream and ice cream	12,000,000
Calves produced on dairies	3,000,000
Skim milk and buttermilk	1,750,000
Total	$38,377,342

Butter and Cheese Prices in San Francisco Market.

(Cents per pound.)

Month	1912-1913		1913-1914		1914-1915	
	Butter	Cheese	Butter	Cheese	Butter	Cheese
October	34.00	16.92	32.48	17.03	32.50	17.00
November	33.04	17.93	32.56	18.37	34.00	16.50
December	33.66	15.89	31.85	17.69	31.50	13.50
January	34.28	15.44	29.92	18.06	32.00	15.00
February	35.10	16.63	28.19	18.89	30.50	14.00
March	35.43	15.47	22.85	16.45	27.50	14.50
April	29.10	15.88	23.06	14.76	23.50	13.00
May	26.98	14.22	23.83	13.52	24.00	12.00
June	27.72	14.79	24.02	12.99	26.00	11.50
July	28.95	15.54	24.55	13.23	27.00	13.00
August	32.43	17.16	27.26	14.08	28.00	13.00
September	34.78	16.82	30.81	14.37	28.00	16.00
Average	32.12	16.06	27.61	15.79	28.70	14.10

Receipts of Butter and Cheese in San Francisco for the Two Years Ending September 30, 1915.

Month	1913-1914		1914-1915	
	Butter	Cheese	Butter	Cheese
October	1,538,100	616,400	1,463,600	841,500
November	1,433,300	776,300	1,315,400	548,800
December	1,703,100	736,100	1,735,100	538,300
January	1,931,600	559,400	1,539,600	508,400
February	1,689,900	704,600	1,553,800	488,000
March	2,107,200	739,700	2,575,500	603,400
April	2,811,200	1,044,700	2,996,300	775,800
May	2,435,300	865,100	3,154,866	796,600
June	1,964,400	1,282,700	2,775,334	1,403,300
July	1,871,600	1,027,300	3,598,000	1,455,200
August	1,765,500	1,079,000	2,591,400	1,248,900
September	1,329,750	660,200	2,023,800	1,392.400
Totals	22,580,950	10,091,500	27,323,500	10,660,600

Imports and Exports.

About 50,000,000 pounds of cheese is imported, and on an average of about 3,000,000 pounds of domestic cheese exported. The duty on imported butter is 2½ cents per pound, and cheese 20 per cent ad valorem on October 4, 1913, and after.

BEES, HONEY, AND WAX.

In the earlier years the parent stock of the honey bee in this country was the common brown or black bee of Germany. In 1860 the Department of Agriculture introduced the Italian bee, about twenty years later the Cyprian, and still later the Carniolan.

Summary of Honey and Wax, 1860-1910.

(From census reports.)

Year	Honey, pounds	Wax, pounds
1860	12,276	584
1870	294,326	4,903
1880	574,029	14,672
1890	3,929,889	60,237
1900	3,667,738	115,330
1910	10,264,715	126,445

The number of farms reporting bees decreased from 6,915 in 1900 to 6,870 in 1910, while the colonies of bees increased from 129,444 to 201,023, or 55.3 per cent, and the value increased from $363,885 to $729,793, or 100.6 per cent.

The average production of honey is 70 pounds to the colony, and the average value 6 cents per pound. The price varies according to color and quality, the extracted honey from 4 to 7½ cents, and comb honey from 10 to 18 cents per pound. In many portions of the State great loss is caused by American and European foul brood, commonly called black brood, the percentage of damage having steadily risen from 7 per cent in 1909 to 20 per cent in 1912, and 25 per cent in southern California in 1913.

Production of Honey, 1902-1915.

Year	Pounds	Year	Pounds
1902	5,125,000	1909	10,500,000
1903	8,400,000	1910	4,500,000
1904	1,040,000	1911	5,600,000
1905	9,500,000	1912	4,800,000
1906	5,250,000	1913	3,200,000
1907	6,550,000	1914	7,900,000
1908	5,250,000	1915	9,300,000

TABLE XX.

Bees, Beeswax, and Honey by Counties.

(From census reports.)

Counties	Colonies, 1909	Honey, pounds, 1909	Beeswax, pounds, 1909
Alameda	610	9,848	179
Alpine	49	220	
Amador	170	2,402	100
Butte	1,384	9,702	170
Calaveras	362	8,413	118
Colusa	1,406	67,689	798
Contra Costa	698	15,950	284
Del Norte	78	1,395	
El Dorado	464	8,105	75
Fresno	9,242	616,609	7,261
Glenn	420	10,982	250
Humboldt	1,803	23,481	367
Imperial	4,740	514,125	4,453
Inyo	5,868	312,620	2,131
Kern	4,501	204,920	2,832
Kings	4,690	238,791	3,148
Lake	276	5,105	43
Lassen	298	5,642	5
Los Angeles	25,930	1,289,820	15,501
Madera	375	16,439	370
Marin	20	205	55
Mariposa	34	300	25
Mendocino	441	6,090	34
Merced	4,072	204.098	3,150
Modoc	839	19,796	232
Mono	438	20,355	425
Monterey	3,669	177,279	2,619
Napa	524	8,939	204
Nevada	260	5,452	42
Orange	5,159	325,656	2,764
Placer	657	7,338	80
Plumas	121	2,280	5
Riverside	18,900	902,106	12,915
Sacramento	1,835	55.272	160
San Benito	1,777	68,253	773
San Bernardino	8,073	363,025	5,983
San Diego	30,566	1,559,607	18,589
San Francisco	6		
San Joaquin	3,014	104,645	3,459
San Luis Obispo	3,936	177,342	1,983
San Mateo	289	5,458	193
Santa Barbara	4,072	288,875	4,060
Santa Clara	2,542	77,252	842
Santa Cruz	693	11,032	98
Shasta	689	8.466	185
Sierra	49	2,081	10
Siskiyou	2,775	85,322	324
Solano	256	2,873	
Sonoma	824	7,014	44
Stanislaus	2,554	61,592	1,371
Sutter	2,055	76,812	745
Tehama	786	15,779	115
Trinity	98	1,605	13
Tulare	9,568	290,435	4,743
Tuolumne	363	12,310	65
Ventura	23,714	1,839,986	20.918
Yolo	2,442	106,982	1,125
Yuba	149	545	10
Totals	201,023	10,264,715	126,445

CALIFORNIA HONEY CROP, AND IMPORTS AND EXPORTS OF HONEY AND WAX, 1900-1915.*

(Duty on imported honey, 10 cents per gallon.)

Year	California crop, pounds	Exports of domestic honey, value	Imports, gallons	Value
1900	2,208,000	$30,191	146,860	$70,857
1901	8,112,000	55,574	182,196	83,599
1902	5,125,000	106,112	167,301	56,383
1903	8,400,000	64,220	287,696	115,400
1904	1,040,000	69,317	206,292	69,053
1905	9,500,000	63,367	198,617	76,719
1906	5,250,000	111,945	138,221	50,651
1907	6,500,000	93,690	175,672	70,854
1908	5,250,000	78,102	211,992	98,425
1909	10,500,000	85,578	145,691	60,884
1910	4,500,000	159,401	103,640	52,968
1911	9,500,000	81,649	112,553	62,942
1912	4,800,000	212,652	115,040	62,684
1913	3,200,000	182,252	116,271	68,717
1914	7,900,000	135,669	75,079	38,665
1915	9,300,000	114,038	303,965	124,843

*For the statistics previous to 1900, see the Report for 1913, pages 64, 66.

IMPORTS AND EXPORTS OF BEESWAX, 1900-1915.

(Duty free.)

Year	Exported domestic		Imported	
	Pounds	Value	Pounds	Value
1900	319,379	$91,913	213,813	$51,526
1901	140,276	39,464	213,773	55,884
1902	125,283	36,541	408,706	115,937
1903	70,811	21,337	488,576	127,220
1904	55,631	16,545	425,168	116,878
1905	85,406	24,966	373,569	101,121
1906	101,726	29,894	587,617	168,014
1907	117,169	36,392	917,088	264.637
1908	90,506	28,659	671,526	194,769
1909	77,547	23,293	764,937	231,559
1910	89,890	27,740	972,145	282,905
1911	101,735	31,404	902,904	270,112
1912	109,478	32,556	1,076,741	328,752
1913	116,296	33,131	828,793	253,867
1914	96,215	27,292	1,412,200	476,364
1915	181,328	57,971	1,564,506	439,541

WOOL.*

The following estimates are taken from the annual report of the National Association of Wool Manufacturers, Boston:

	1912	1913	1914	1915
Sheep of shearing age on April 1st	1,700,000	1,600,000	*1,852,000	1,900,000
Average weight of fleece, pounds	7	7	6.2	6.1
Per cent of shrinkage	67	67	65	64
Wool washed and unwashed, pounds	11,900,000	11,200,000	11,480,000	11,590,000
Equivalent quantity of scoured wool, pounds	3,927,000	3,696,000	4,100,800	4,172,000
Average value per scoured pound October 1st	$0.56	$0.45	$0.54	$0.45
Total value October 1st	$2,199,120	$1,663,200	$2,214,432	$2,711,800

*Number of fleeces.

The comparative prices of California wool at Boston has been as follows on the scoured basis, per pound:

PRICES OF WOOL, 1905-1915.

Year	Cents		Year	Cents	
	Spring	Fall		Spring	Fall
1905	74	62	1911	48	40
1906	70	60	1912	54	45
1907	68	58	1913	48	40
1908	50	40	1914	53	45
1909	70	53	1915	65	55
1910	55	45			

CALIFORNIA WOOL PRODUCTION, 1905-1915.*

(Commercial estimates. Duty—Free on and after December, 1913.)

Year	Pounds	Year	Pounds
1905	22,000,000	1911	12,000,000
1906	24,000,000	1912	11,900,000
1907	15,750,000	1913	11,200,000
1908	14,560,000	1914	11,480,000
1909	15,000,000	1915	11,590,000
1910	13,500,000		

*For the California wool production from 1854–1903, see Report for 1913, page 67. The imports of wool are given under so many classifications of camel, goat, alpaca, etc., unmanufactured and maunfactured, that space will not allow the details to be given here.

MOHAIR.

Under the encouragement of a 15 per cent duty the production of this valuable fiber has probably increased, especially in Texas. The total production in the United States is estimated at 6,000,000 pounds, with an average value of 30 cents per pound at Boston. Texas, Oregon, New Mexico, California, and Arizona are the principal sources of supply of domestic mohair.

PART III.

AGRICULTURE.

(CONTINUED.)

FARMS AND FARM CROPS.

CEREALS, HAY AND FORAGE, SUGAR BEETS, HOPS, COTTON, RICE, TOBACCO, GINSENG, VEGETABLES, PLANTS, AND NURSERY PRODUCTS.

California Farm Crops for Ten Years, 1905-1915, Principal Crops by Counties.

FARM CROPS.

In comparing one year with another it should be borne in mind that acreage is, on the whole, a better index of the general change or tendencies of agriculture than either the quantity or the value of the crops, since variations in quantity may be due largely to temporarily favorable or unfavorable climatic conditions, and variations in the value of the crops are largely affected by changes in prices. The acreage in fruits and nuts can not be given, as the extent of the industry has always been calculated by the number of trees only.

Crops	Acreage, 1909	Value
Cereals	1,970,492	$28,039,826
Other grains and seeds	163,776	6,517,453
Hay and forage	2,533,347	42,187,215
Tobacco	4	479
Cotton (including cotton seed)	324	12,776
Hemp	300	39,000
Hops	8,391	1,731,110
Broom corn	1,023	32,509
Sugar crops	79,604	4,335,358
Sundry minor crops	7	840
Potatoes and sweet potatoes and yams	72,799	5,235,073
Other vegetables	79,163	6,886,885
Flowers, plants, and nursery products	5,816	3,601,301
Small fruits	9,687	1,789,214
Totals	4,924,733	$100,409,039
Seeds		$800,758
Fruits and nuts		48,917,655
Forest products of farm		2,949,732
Miscellaneous		33,829
Total		$52,701,974

Summary of California Crops Harvested in 1909.

(Compiled from reports of the Bureau of the Census.)

Crop cereals	Number of farms reporting	Acres	Amount	Value
			Bushels	
Corn	5,728	51,935	1,273,901	$1,077,411
Oats	2,477	192,158	4,143,688	2,637,047
Wheat, total		478,217	6,203,206	6,323,983
Common winter	3,628	413,687	5,168,210	5,311,387
Common spring	1,075	64,070	1,029,907	1,006,819
Durum or macaroni	7	460	5,089	5,777
Emmer and spelt	19	840	19,755	13,758
Barley	7,597	1,195,158	26,441,954	17,184,508
Buckwheat	26	849	14,681	11,569
Rye	193	7,027	70,683	65,846
Kaffir corn and Milo maize	2,521	44,308	938,049	725,704
Total cereals		1,970,492	39,105,917	$28,039,826
Hay and forage—			Tons	
Timothy alone	370	13,725	20,001	$185,579
Timothy and clover mixed	958	46,661	73,183	629,575
Clover alone	703	8,519	20,380	213,289
Alfalfa	19,904	484,134	1,639,707	13,088,530
Millet or Hungarian grasses	101	2,142	2,688	27,483
Other tame or cultivated grasses	2,274	90,414	119,415	1,253,428
Wild, salt or prairie grasses	3,679	253,127	281,033	2,028,494
Grains cut green	39,397	1,604,745	2,019,526	24,056,727
Coarse forage	2,175	25,868	60,611	438,095
Root forage	1,021	4,012	90,586	266,015
Totals	53,760	2,533,347	4,327,130	$42,187,215
Sundry crops—			Bushels	
Potatoes	12,533	67,888	9,824,005	$4,879,449
Sweet potatoes and yams	1,133	5,111	572,814	355,624
Tobacco	12	4	[1]4,502	479
Cotton	18	324	[2]183	11,744
Cotton seed (estimated), 92 tons				1,032
Hops	273	8,391	[1]11,994,953	1,731,110
Hemp	2	300	[1]600,000	39,000
Broom corn	24	1,023	[1]614,250	32,509
Sundry minor crops		7		840
Other grains and seeds—			Bushels	
Dry edible beans	3,054	157,987	3,328,218	$6,295,457
Horse beans	67	150	5,534	5,659
Dry peas	262	2,959	57,468	101,016
Peanuts	42	99	2,991	2,889
Flaxseed	8	240	1,882	3,224
Mustard seed	66	1,964	63,365	100,731
Sorghum cane seed	14	103	1,147	1,997
Sunflower seed	21	257	6,855	6,264
Timothy seed	4		357	1,065
Clover seed	10		310	2,823
Alfalfa seed	347		23,791	200,823
Other tame grass seed	5		1,077	1,323
Flower and garden seeds	109			594,724
Totals		163,776	3,467,885	$6,517,453

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[1] Pounds. [2] Bales.

Size of Cereal Crops.

The acreage sown to wheat and other cereal crops in California has greatly decreased in recent years, the land being devoted to orchards and vineyards, which yield a much higher profit.

Barley.

California, however, has held the first place in the production of barley for a number of years, as far back as the year 1852. The area in barley has been upwards of 1,000,000 acres since 1901, the largest area being in 1910, with 1,195,000 acres. The yield per acre varied from 16.7 bushels in 1900 to 31.0 in 1910, when the production was 46,500,000 bushels, or the largest on record. In 1914 the estimated acreage was 1,402,000, and the production 42,060,000 bushels.

Buckwheat.

This crop has never been grown to any extent in California; therefore, the production being so small, regular records have not been kept. The area under cultivation is but a few hundred acres, and the production from 10,000 to 15,000 bushels.

Corn.

Corn has also fallen off; the acreage was between 100,000 and 161,000 in former years, the highest production being in 1891, when it amounted to upward of 5,570,000 bushels. In 1910 it amounted to only 1,273,000 bushels, and in 1914 to 2,160,000 bushels. In 1915 the production was 2,624,000 bushels, classified as follows: white, 1,102,000, or 42 per cent; yellow, 1,443,000, or 55 per cent; mixed, 79,000, or 3 per cent. The total crop in the United States was almost equally divided between white corn and yellow corn; mixed corn amounting only to 14.5 per cent.

Oats.

In oats the acreage has increased from 153,000 acres in 1900 to 192,000 in 1910 and 220,000 in 1914, producing 7,700,000 bushels.

Rye.

Rye has always been a small crop in California, and the area and production have fallen off greatly in recent years, the acreage being 62,925 in 1900 and 7,027 in 1910, and the production 524,451 and 70,683 bushels, respectively. In 1914 the acreage was 8,000 and the production 136,000 bushels.

Wheat.

In wheat, the production decreased heavily between 1900 and 1910, while potatoes, hay, and hops all showed an increase. The acreage in wheat in 1914 was 400,000, and the estimated production 6,800,000 bushels.

Broom Corn.

This crop has never been grown to any extent in California. The production from 1880 to 1910 has been: In 1880, 191,600 pounds; 1890, 815 acres and 611,975 pounds; 1900, 1,669 acres, 1,146,000 pounds, and 1910, 1,023 acres and 614,250 pounds.

Potatoes.

The acreage in potatoes in 1914 was 75,000, compared with 68,000 the previous year, and the production 10,350,000 bushels, compared with 8,092,000 in 1913.

Sweet Potatoes.

In 1915 the acreage in sweet potatoes was about 6,000, and the production 810,000 bushels, compared with 966,000 bushels in 1914. The same acreage in 1913 produced 1,020,000 bushels.

Hay.

The acreage in hay in 1915 was 2,511,000, compared with 2,700,000 the previous year, and the production 4,520,000 tons, compared with 5,265,000 in 1914. It may be noted that the average yield and average price of the above crops in California are in most cases considerably above the average for the United States as a whole.

SUMMARY OF FARM CROPS, 1850-1910.*

(Compiled from the reports of the Bureau of the Census.)

Year	Barley		Buckwheat		Corn	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
1850		9,712				12,236
1860		4,415,426		7,887		510,708
1870		8,783,490		21,928		1,221,222
1880	586,350	12,463,561	1,012	22,307	71,781	1,993,325
1890	815,995	17,548,386	664	10,388	70,303	2,381,270
1900	1,029,647	25,149,335	395	7,835	53,930	1,477,093
1910	1,195,158	26,441,954	849	14,681	51,935	1,273,901

Year	Oats.		Rye		Wheat	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
1850						17,328
1860		1,043,006		52,140		5,928,470
1870		1,757,507		26,275		16,676,702
1880	49,947	1,341,271	20,281	181,681	1,832,429	29,017,707
1890	57,569	1,463,068	27,413	243,871	2,840,807	40,869,337
1900	153,734	4,972,356	62,925	524,451	2,683,405	36,534,407
1910	192,158	4,143,688	7,027	70,683	478,217	6,203,206

Year	Potatoes		Hay		Hops	
	Acres	Bushels	Acres	Tons	Acres	Pounds
1850		9,292		2,038		
1860		1,789,463		305,655		80
1870		2,049,227		551,773		625,064
1880		4,550,565	758,024	1,045,119		1,444,077
1890	38,178	3,664,920	1,431,574	2,218,285	3,974	6,547,338
1900	42,098	5,242,596	2,339,601	3,035,266	6,890	10,124,660
1910	67,688	9,824,005	2,533,347	4,327,130	8,391	11,994,953

*When blank, the acreage or production, if any, was not reported.

The hay crop in 1915 has been estimated by kinds of hay for the first time by the Department of Agriculture. The classification used was the same as used in the 1910 census. Estimate for 1915 and Census Report for 1909 are given below:

	1915. estimate		1909. census	
	Tons	Per cent	Tons	Per cent
Timothy	19,054,000	22.3	17,985,000	26.1
Timothy and clover mixed	18,713,000	21.9	24,749,000	36.0
Clover alone	12,527,000	14.7	3,158,000	4.6
Alfalfa	18,562,000	21.8	11,860,000	17.2
Millet and Hungarian grass	3,230,000	3.8	1,547,000	2.2
Grains cut green for hay	6,962,000	8.2	5,367,000	7.8
Other tame hay	6,205,000	7.3	4,167,000	6.1
Total tame hay	85,225,000	100.0	68,833,000	100.0
Wild, salt, and prairie hay	21,491,000	----------	18,384,000	---------
Coarse forage	----------	----------	9,982,000	---------

The most striking changes in the estimated production this year as compared with the figures for 1909, aside from the increase in total production, are large increase in the proportion credited to clover hay, the decrease in the proportion of timothy and clover mixed, and the increase in alfalfa.

FARM CROPS IN 1915, COMPARED WITH 1914.

Farm Crops. The acreage and yield of farm crops varied considerably in 1915 compared with the previous year.

Cereals. In most years California produces more barley than any other state in the Union, but in 1915 it was slightly exceeded by North Dakota and Minnesota. The acreage in 1914 was 1,402,000, and in 1915, 1,360,000; the yield per acre was 30 bushels in 1914, and 29 bushels in 1915. The production in 1914, was 42,060,000 and in 1915, 39,440,000. The average farm price on December 1, was 59 cents in 1914, and 62 cents in 1915.

The production of buckwheat is very small, there being only a few hundred acres.

In corn the acreage shows a small increase, the area being 60,000 in 1914, and 64,000 in 1915, and the average yield per acre was 41 bushels as compared with 36 bushels in 1914. The total production was 2,160,000 in 1914, and 2,624,000 bushels in 1915. The average farm price per bushel on December 1, 1914, was 87 cents and 88 cents in 1915.

In winter wheat there was an increase in the acreage of from 400,000 acres in 1914, to 440,000 in 1915. The yield per acre averaged one bushel less than in 1914, the quantity in that year being 17 bushels an acre, and 16 bushels in 1915. The total production amounted to 6,800,000 bushels in 1914 and 7,040,000 bushels in 1915. The average farm price on December 1 was $1.04 in 1914, and 95 cents in 1915.

In oats there was a falling off in the acreage of from 220,000 acres in 1914, to 211,000 in 1915. The yield per acre also declined from 35 bushels in 1914 to 33 bushels in 1915. The production was 7,700,000 bushels in 1914, and 6,963,000 bushels in 1915. The average farm price per bushel on December 1, was 53 cents in 1914 and 50 cents in 1915.

Rye is always a small crop in California, the acreage the last two years being only 8,000. The average yield per acre was 17 bushels in 1914, and 14 bushels in 1915. The production amounted to 136,000 bushels in 1914, and 112,000 bushels in 1915. The average farm price on December 1 was 85 cents per bushel in 1914 and 90 cents in 1915.

The acreage in potatoes was 78,000, compared with 75,000 in 1914. The average yield per acre was 138 bushels in 1914, and 130 bushels in 1915. The production amounted to 10,350,000 bushels in 1914, and 10,140,000 bushels in 1915. The average farm price per bushel on December 1, was 70 cents in 1914, and 75 cents in 1915.

The acreage in sweet potatoes is small, the last two years amounting to 6,000 only. The yield per acre was 161 bushels in 1914, and 135 bushels in 1915. The total production was 966,000 bushels in 1914, compared with 810,000 in 1915. The average farm price on December 1, was 87 cents in 1914, and 80 cents in 1915.

In the production of hay, there was a falling off in the acreage and production, but a considerable rise in price. The acreage was 2,700,000 in 1914, and 2,511,000 in 1915; and the yield per acre, 1.95 tons in 1914, and 1.80 tons in 1915. The production was 5,265,000 tons in 1914, and 4,520,000 in 1915. The average farm price on December 1, was $8.20 per ton in 1914, and $11.20 in 1915.

MINOR CROPS.

The cultivation of rice keeps making steady progress, as also does cotton in Imperial Valley. In 1915, the acreage in the Sacramento Valley amounted to 28,975, Butte County leading with 15,200 acres, Colusa being second with 8,750 acres. In the San Joaquin Valley there were 3,125 acres, Fresno County leading with 1,120 acres. There were 10 acres in Imperial, and 10 in Ventura counties, bringing up the total to over 32,000 acres. The total production of rice was approximately 888,000 sacks of 100 pounds each. In 1914 there were only 16,000 acres in rice, and the crop amounted to about 440,000 sacks.

Beet sugar shows an increase, the amount produced in 1914 amounted to 338,135,600 pounds, and in 1915, 390,762,500 pounds. The number of factories operating in 1915 was 11, the acreage harvested 122,737, and the quantity of sugar beets worked 1,249,111 short tons.

Cotton. The cultivation of cotton in California has become of commercial importance within the past six years. In 1914 there were 15,000 acres in Imperial Valley, and in 1915, the area was about the same, owing to the financial depression in the previous season, when cotton sold at from 6 cents to 8 cents a pound. This year (1916) it is estimated that 50,000 acres have been planted.

The hop crop was a good one, amounting to 115,000 bales of about 190 pounds, compared with 110,000 bales in 1914. The prices were lower, the highest being 14 cents a pound compared with 18 cents in 1914.

Tobacco was raised for a year or two, mostly in Fresno and Tulare counties, and also in Los Angeles County. At one time great hopes were entertained that it would become an important crop in California, and from 1909 to 1913 a certain quantity was raised, but lately the growers experienced much difficulty in disposing of their crop at a fair price, as the manufacturers claimed that the quality was poor, and therefore its cultivation has practically been discontinued as a commercial crop. It is stated that a shipment equivalent to a carload of "Turkish" tobacco grown in Fresno and Tulare counties has recently been made to Australia as an experiment.

Imports and Exports. The quantity of breadstuffs imported is always very small, with the exception of rice, of which 290,144,034 pounds, value $6,372,295, were imported in 1915; and macaroni, vermicelli and similar preparations of which 35,703,830 pounds, value $2,229,457 were imported in 1915. In the value of breadstuffs exported during the last two years, owing to the war in Europe there has been an enormous increase which breaks all former records.

	1914		1915	
	Bushels	Value	Bushels	Value
Barley	18,208,186	$11,183,382	26,490,665	$19,312,498
Corn	15,525,149	12,246,293	48,245,628	38,481,349
Wheat	173,861,944	187,184,100	205,829,820	282,457,092
Wheat flower (barrels)	12,769,073	62,391,503	15,680,801	96,201,234
Total breadstuffs (including preparations not named)		$310,280,873		$527,882,389

For the previous four years the total values have been:

	Value
1913	$203,391,856
1912	161,672,348
1911	135,860,349
1910	109,093,689

THE BEST COUNTIES FOR CERTAIN CROPS.

The six leading counties in the production of cereals, hay and forage, potatoes, sweet potatoes, beans, peas, and other vegetables, and sugar beets are as follows, and may be taken to show the districts in which experience has proved that they are best suited. The acreage is that given in the last census.

Barley.

County	Acreage	County	Acreage
San Joaquin	125,114	Colusa	89,985
Monterey	98,923	Merced	88,145
Madera	90,341	Stanislaus	57,529

Corn.

Los Angeles	9,084	Tulare	2,527
San Diego	4,554	San Joaquin	2,547
Orange	3,054	Ventura	2,409

Oats.

County	Acreage	County	Acreage
Stanislaus	38,546	San Mateo	16,125
San Joaquin	23,208	Madera	10,569
Merced	19,843	Santa Barbara	9,494

Rye.

Merced	2,108	Lassen	526
San Joaquin	1,843	Modoc	406
Plumas	704	Siskiyou	306

Wheat.

Tulare	66,567	San Joaquin	24,786
Madera	39,468	Monterey	22,924
San Luis Obispo	33,608	Stanislaus	22,068

Kaffir Corn and Milo Maize.

Tulare	10,987	Kings	3,931
Imperial	9,789	San Joaquin	2,968
Stanislaus	4,448	Kern	2,813

Hay and Forage.

Los Angeles	154,048	Fresno	95,265
San Joaquin	104,916	Contra Costa	88,937
Tulare	91,595	Riverside	88,430

Potatoes.

San Joaquin	9,895	Los Angeles	2,799
Sacramento	5,036	Monterey	2,374
Sonoma	3,260	Alameda	1,854

Sweet Potatoes.

Merced	780	San Joaquin	88
Los Angeles	218	Orange	75
Sacramento	117	Sutter	48

Beans.

Ventura	58,744	San Joaquin	13,954
Santa Barbara	22,355	San Luis Obispo	11,169
Orange	21,186	Sacramento	7,801

Peas.

County	Acreage	County	Acreage
Ventura	756	Alameda	215
Humboldt	517	San Mateo	186
Stanislaus	415	Monterey	154
San Joaquin	362		

All Other Vegetables.

Los Angeles	13,385	Sacramento	6,367
Alameda	7,159	Santa Clara	4,241
San Joaquin	6,728	Orange	3,785

Sugar Beets.

Ventura	14,333	Orange	10,275
Los Angeles	14,191	Monterey	9,900
Santa Barbara	11,320	Yolo	5,714

Value of Farm Crops by Counties.

The leading counties in the production of various crops, classed according to value, are as follows:

Cereals.

(Value of $1,000,000 and upward.)

County	Value	County	Value
San Joaquin	$3,238,000	Solano	$1,292,000
Monterey	1,695,000	Madera	1,220,000
Merced	1,691,000	Yolo	1,032,000
Colusa	1,578,000	Tulare	1,442,000
Stanislaus	1,315,000		

Hay and Forage.

(Value of $1,000,000 and upward.)

County	Value	County	Value
Los Angeles	$3,430,000	Stanislaus	$1,424,000
San Joaquin	1,763,000	Tulare	1,362,000
Fresno	1,702,000	Merced	1,355,000
Riverside	1,624,000	Kings	1,171,000
Contra Costa	1,617,000	Sonoma	1,170,000
Santa Clara	1,587,000	Monterey	1,125,000
Alameda	1,547,000	San Diego	1,110,000

Vegetables.

County	Value
San Joaquin	$2,149,000
Los Angeles	1,255,000
Contra Costa	1,125,000

SUGAR BEETS.*

All the coast valleys of California are favorably situated, in respect to temperature, for the production of sugar beets, and the same may be said of certain lands in other parts of the State. In California there is a larger acreage that is well adapted to the growing of sugar beets than is found in any other state in the Union.

(From the Reports of the Census.)

California Sugar Crops, 1899 and 1909.

Product	Number of farms	Acres	Production		
			Amount	Unit	Value
Sugar beets—					
1899	863	41,242	356,535	tons	$1,550,346
1909†	1,113	78,957	845,191	tons	4,320,532
Sorghum cane—					
Total cane, 1899					$3,788
In 1899 cane grown	54	140	1,085	tons	
In 1899 cane sold as such			6	tons	10
In 1899 syrup made			8,671	gallons	3,778
Total cane, 1909					14,826
In 1909 cane grown	48	647	3,021	tons	
In 1909 syrup made	8		4,330	gallons	2,340

*For further details regarding beet sugar, see Report for 1913, pages 73-77.
†Includes beets and cane used as forage.

The cultivation of the beet greatly improves the land. According to a Leipzig University professor, the following was the average increase in ten years on one estate:

	Yield before beet culture (bushels) per acre	Yield after beet culture (bushels) per acre	Per cent increase because of beet culture
Wheat	24.5	41.3	68.6
Rye	28.4	40.8	43.7
Oats	61.8	75.3	21.8
Barley	23.2	43.5	87.5
Potatoes	218.6	238.0	8.97
Rape	23.2	48.8	110.0

The following table gives a complete list of beet sugar plants in California, with their names and the location of factories. It also shows the daily slicing capacity, expressed in tons of beets, for each factory.

Beet Sugar Companies and Factories of California in 1915.

Manufacturing companies in California	Factory location	Daily slicing capacity, tons of beets
Alameda Sugar Company	Alvarado, Alameda County	800
Los Alamitos Sugar Company	Los Alamitos, Orange County	700
Spreckels Sugar Company	Spreckels, Monterey County	4,000
Union Sugar Company	Betteravia, Santa Barbara Co.	600
American Beet Sugar Company	Chino, San Bernardino County	1,000
American Beet Sugar Company	Oxnard, Ventura County	3,000
The Southwestern Sugar Company	Corcoran, Kings County	600
Sacramento Valley Sugar Company	Hamilton City, Glenn County	700
Holly Sugar Company	Huntington Beach, Orange Co.	750
Anaheim Sugar Company	Anaheim, Orange County	600
Santa Ana Co-operative Sugar Co.	Santa Ana, Orange County	600
San Joaquin Valley Sugar Co.	Visalia, Tulare County	500
Southern California Sugar Co.	Santa Ana, Orange County	400
Total		14,250

Beet Sugar, 1900-1915.

(Duty on beets, 15 per cent ad valorem; sugar beet seed free.)

Year	California production, pounds	Imported raw beet sugar	
		Pounds	Value
1900	60,638,000	701,539,452	$14,800,609
1901	137,400,000	908,683,078	20,028,575
1902	147,535,000	255,030,219	4,202,044
1903	131,080,000	87,130,805	1,223,023
1904	118,394,000	2,414,454	50,525
1905	122,500,000	223,944,976	4,797,278
1906	178,000,000	48,548,919	1,032,040
1907	154,800,000	397,745,046	8,203,309
1908	195,000,000	221,036,900	5,401,378
1909	245,000,000	98,625,908	2,521,798
1910	289,493,000	1,148	43
1911	325,076,000	24,669,287	593,037
1912	317,363,000	6,504,260	239,484
1913	342,416,000	182,647,582	4,169,523
1914	338,135,600	2,367,708	70,829
1915	390,686,000	877,623	29,386

Sugar Beets and Beet Sugar Produced in California, 1905-1915.

Year	Number factories in operation	Sugar beets			Sugar made (chiefly refined)	
		Area harvested, acres	Beets used for sugar, short tons	Average per acre, short tons	Short tons	Pounds
1905		51,857	514,391	9.92	73,893	147,786,900
1906	8	60,141	671,571	11.17	92,740	185,480,000
1907	8	47,387	484,816	10.23	73,023	146,045,500
1908	8	62,302	647,085	10.39	89,890	179,780,000
1909	10	83,000	882,084	10.63	127,272	254,544,000
1910	8	90,500	923,100	10.20	139,890	279,780,000
1911	10	99,545	1,037,283	10.42	161,300	322,600,000
1912	11	111,416	1,004,328	9.01	158,904	317,808,000
1913	12	127,610	1,138,003	8.92	171,208	342,416,000
1914	10	104,000	1,082,000	10.4	169,004	338,008,000
1915	11	122,737	1,249,111	10.2	195,343	390,686,000

The average price paid for sugar beets was $5.86 per ton. The quantity of beet sugar produced in the State in 1915, was the largest in the history of the industry. The amount of beet sugar produced in the United States during the last five years shows a steady increase, the totals being:

Beet Sugar Production in United States, 1911-1915.

Year	Number of factories	Acreage	Beets used, short tons	Short tons
1911	66	473,877	5,062,333	599.500
1912	73	555,300	5,224,377	692,556
1913	71	580,006	5,659,462	733,401
1914	60	483,400	5,288,500	722,054
1915	67	624,000	6,462,000	874.220

Payment for sugar beets is made to the growers according to the weight of the beets without tops. An estimated amount of tare on account of dirt, improperly topped beets, etc., is deducted from the gross weight of the topped beets as delivered by growers. For the past four years the value of the beet crop to growers has ranged from $30,000,000 to $33,000,000 a year.

Some time elapses between the delivery of the beets and their use in the factory. The harvesting season may close from six to eight weeks earlier than the end of the sugar-making season. During this period beets lose in weight by drying, which causes some loss to the growers.

Sorghum Syrup, 1860-1910.

Sorghum was first introduced into the United States in 1853. Tennessee, Missouri and Kentucky are the largest producers. The following table shows the production in California from 1860 to 1910:

Year	Gallons
1860	552
1870	333
1880	2,459
1890	1,670
1900	8,671
1910	4,330

HOPS.*

The leading states in the production of hops are California, Oregon, Washington and New York.

The leading counties in the production of hops in California are Sonoma, Sacramento, Mendocino and Yuba.

The total area devoted to the production of hops in California in 1909 was 8,391 acres, producing about 11,994,953 pounds of hops, valued at $1,731,110. The climatic conditions and soil of California are more perfectly adapted to this crop than any other state in the Union, and its average production per acre is greater. The average production per acre in other hop-producing countries of the world has been estimated as follows: England, 905 pounds; Germany, 510 pounds; in the United States, 885 pounds, and in California, 1,469 pounds.

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*For further details regarding hops, see Report for 1913, pages 77-79.

The cultivation of hops in California has increased rapidly, as shown by the following figures, but owing to the low prices several hundred acres were abandoned in 1915, with a possibly larger quantity to be plowed up after the coming crop, provided that hops sell at present cost of production prices. It is estimated that the 1916 crop has been reduced between five and eight per cent.

California Hop Crop, 1860-1910.

(From the Bureau of the Census.)

Year	Acres	Pounds
1860		80
1870		625,064
1880	1,119	1,444,077
1890	3.974	6,547,338
1900	6.890	10,124,660
1910	8,391	11,994,953

NOTE.--The acreage was not reported prior to 1880.

The highest and lowest prices per pound paid to growers during the last eight years have been as follows:

Year	Highest, cents	Lowest, cents
1908	14	7
1909	25	12
1910	30	15
1911	45	25
1912	22	13
1913	26	13
1914	18	5
1915	14	7

California Hops, Imports and Exports, 1900-1915.

(Duty, 16 cents per pound.)

Year	California crop		Exports		Imports	
	Bales*	Pounds	Pounds	Value	Pounds	Value
1900	36.000	7.056.000	12.639,474	$1,707,660	2,589,725	$713,701
1901	48,000	9.360.000	14.963,676	2,466,515	2.606.708	851,008
1902	53.000	10,176,000	10.715,151	1,550,657	2.805,293	833,702
1903	56,000	10,752,000	7,794,705	1,909,951	6,012,510	1,808,491
1904	63.000	12.222.000	10,985,988	2,116,180	21,758.163	1.374.327
1905	67.500	13.095,000	14.858.612	4,480,666	4,339,379	1,980,804
1906	80,000	15.520.000	13.026,904	3,125,843	10,113,989	2,326,982
1907	82.000	16,072.000	16,809,534	3,531,972	6,211,983	1,974,900
1908	68,000	13,260,000	22,920,480	2,963.167	8,493,265	1,989,261
1909	69,000	12,765,000	10,446,884	1,271,629	7,386,574	1,337,099
1910	71,000	13.135.000	10.589,254	2,062.140	3,200,560	1,499,354
1911	87,000	16,095.000	13,104,774	2,130,972	8,557,531	2,706,600
1912	117,000	21,645,000	12,190,663	4,648,505	2,991,125	2,231,348
1913	118,500	21.922,500	17,591,195	4,764,713	8,494,144	2,852,865
1914	110.000	20.350.000	24,262,896	6,953,529	5,382,025	2,790,516
1915	115,000	21,275,000	16,210,443	3,948,020	11,651,332	2,778,735

*A bale averages from 185 to 190 pounds net, the variation depending upon the quality and the compression of the hops.

CALIFORNIA COTTON.*

The first cotton produced was in 1909-1910, and amounted to 350 bales. In 1910, the acreage reported was 10,000, and 12,000 acres in 1911. 1910-1911 the production was 4,000 bales of 500 pounds each. In 1911-1912 the production was 9,420 bales and 4,302,000 pounds of lint. In the season of 1912-1913 the acreage was 8,450 and the production 7,250 bales. The yield per acre was 390 pounds in 1911 and 430 pounds in 1912. This was the highest average in the United States. The acreage in 1914 was 15,000, compared with 10,000 the previous year. The yield per acre was 500 pounds in 1913, and 400 in 1914, and the total production 10,000 bales of 500 pounds gross weight in 1913, and 12,000 bales in 1914. The average price per pound to producers was 13 cents in 1913, and 7 cents in 1914.

The highest price paid for cotton during 1911-1912 was 11 cents and the lowest 8.20 cents. In 1910-1911 the highest was 14 cents and the lowest 11.50 cents. These prices are for "middling" cotton; the price for higher and lower grades varied according to grade. The acreage in 1913 was 22,000, and the yield 21,500 bales of 500 pounds each, very close to a bale per acre, the value amounting to $1,500,000. The staple cotton (or Durango) crop amounted to 6,000 bales. The price for short cotton ranged from $12 to $13.70 per hundredweight; Durango, or staple, $15 to $16.50.

The culture of cotton in California has become of commercial importance within the past six years. Of the two counties now producing cotton, Imperial County has this year (1916) an estimated acreage of 50,000 acres planted in the Imperial Valley, and 200 acres in the vicinity of Bard in the San Pascual Valley, under the Yuma Irrigation Project; Riverside County has about 6,000 acres of cotton in the Palo Verde Valley. In all these localities cotton is grown under irrigation, by far the most extensive irrigation cotton agriculture in the United States. On the Mexcan side of the Imperial Valley fully 60,000 acres are planted to cotton, the crop from which will be ginned and marketed in the Imperial Valley of California. Judging from yields of past seasons the cotton crop which will be marketed from California this fall and winter will approximate 100,000 bales (standard bales of 500 pounds each), worth in the neighborhood of $7,000,000.

Imperial County, the largest cotton producing county in California, began growing cotton in 1909 when 350 bales were grown and marketed. In 1910 the acreage was increased to about 6,000 acres; in 1911, to 11,000 acres; in 1912 the acreage was but 9,000 acres; in 1913 approximately 12,000 acres were grown; in 1914 about 15,000; in 1915 the same. Beginning with 1913 the increase of acreage to cotton on the Mexican side of the Imperial Valley has been greater than in California, a matter which is of interest to California, since all the growers are residents of California who gin and market their crops through Imperial County towns. In a large measure the Mexican grown cotton in Lower California contributes income to the State of California.

Paying prices for cotton have prevailed except during the season of 1914-15 when short-staple cotton sold at from 6 cents to 8 cents per pound. In other seasons from 10 cents to 14 cents per pound has been realized for short-staple cotton. As the yields from properly grown cotton in the Imperial Valley are a bale per acre, sometimes more, the income from cotton growing makes it a profitable business.

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*For further details regarding cotton, see Report for 1912, pages 79-80.

Short-staple cotton, the crop grown generally throughout the South, is planted to about two-thirds of the present acreage in the Imperial Valley. In 1912 Durango cotton, a long-staple American upland cotton similar to that grown in the Yazoo delta of Mississippi, was introduced to the Imperial Valley by the United States Department of Agriculture. This cotton has fiber from $1\frac{3}{16}$ inches to $1\frac{1}{4}$ inches in length and sells at from 2 cents to 5 cents per pound premium over the short-staple cotton. As it produces as well as the short-staple cotton and can be grown for a fraction of a cent more per pound it has commanded increased favor annually. The acreage to Durango cotton has been extended from 200 acres in 1912 to more than 15,000 acres in California the present season. The proportion of Mexican cotton is about the same on the Mexican side, so that between 25,000 and 40,000 bales of the Durango cotton will be marketed from California this season. In the season of 1915-16 Durango cotton sold for 16 to 18 cents; short-staple at 10 to 13 cents per pound.

Egyptian cotton can be grown successfully in the Imperial Valley, but at present labor conditions make it a less profitable crop than the other sorts.

Short-staple cotton is grown exclusively in the Palo Verde Valley (Riverside County). Yields in that valley are equally as good as those in the Imperial Valley. The crop in the vicinity of Bard is part short-staple and part Durango. The industry is now thoroughly established in Imperial Valley. Probably $100,000 of additional capital has been invested, since last year, in the erection of new cotton gins and oil mills.

This last season, cotton has been the best paying crop in Imperial Valley. The farmers are so encouraged that the acreage this coming season will be greatly increased, and there is no doubt but what cotton is now the most staple crop in that section of our State.

In the south, the production per acre has been greatly reduced since the commencement of the European war, due to lack of fertilizing agents. Imperial Valley has not suffered at all in this respect, as the land is automatically fertilized every time they irrigate with the water from the Colorado River. This fact alone has greatly assisted the farmers in that district. The crop this next year will probably be increased to 60,000 bales.

In 1915 about one-fifth of the crop was Durango long staple, the balance short staple. Bales averaged 500 pounds. The average price received for the short staple cotton was 11 to 12 cents; for the Durango cotton 16 to 18 cents per pound. The quality of the cotton was superior to that of the 1914 season, owing to the fact that most of the 1915 crop was grown from seed, while the 1914 crop was largely grown from old stumps (Ratoon cotton) of the previous season's planting. The price was from 5 to 6 cents per pound better in 1915-1916 than in 1914-1915.

Durango cotton has had consistent supporters in the Imperial Valley since 1911, and the acreage since 1913 has had a gradual increase. Owing to peculiar local conditions, the fact that short staple cotton has always been grown on more extensive acreages than the Durango is not a clear indication of the relative popularity of the Durango cotton. Properly grown Durango cotton yields as well in the Imperial

Valley as does similarly grown short staple. The expense of production is a fraction of a cent more per pound than for short staple, so that in a market paying from 2 to 6 cents per pound more for the Durango cotton, the long staple cotton is by far the more profitable.

The acreage is estimated at 100,000 acres, one-third of it being in Imperial County, for the year 1916. Durango acreage will approximate one-third of the total.

Estimated Cotton Crop of the Imperial Valley, 1909-1914.

(In bales of 500 pounds.)

Year	Short staple	Long staple upland	Egyptian	Total crop
1909	350			350
1910	4,000			4,000
1911	8,997	3		9,000
1912	6,950	150	100	7,200
1913	15,500	6,000		21,500
1914	34,900	8,000	100	43,000

SILK.

The production of silk in California is named in the Census of 1870, when 3,587 pounds of silk cocoons were reported. In 1880 a State Silk Culture Association was organized, but later became dormant until revived in 1908 as the Ladies' Silk Culture Society of California. The society has established a farm at Rutherford, Napa County, where they have nearly 800 white and red mulberry trees, and distribute cuttings free to all parts of the State. A ten thousand dollar building has been constructed for hatching worms, and other purposes.

Silkworm eggs have been secured from France and Italy, and in the course of time it is hoped that the work will develop into an important industry. At the San Francisco Land Show, in October, 1913, a gold medal and the blue ribbon were awarded for raw silk produced at the Rutherford farm.

RICE.

If its importance as a food product is to be measured by the number of persons who consume it, rice must, without a doubt, be considered the greatest cereal, as it is more widely and generally used as a food material than any other. Half a century ago experiments were made in the cultivation of rice in California, but they were not successful. In 1860, small quantities were raised in Alameda, Tehama, San Mateo, Santa Cruz and Sonoma counties, but the total amount produced was only 2,140 pounds.

Experiments in California have been conducted on three types of soil, covering a large area in the Sacramento Valley. Three years' results indicate the possibility of growing rice in this region on a commercial scale, the important thing now being to determine the varieties best adapted to the region.

The successful introduction of this crop is dependent upon an abundant supply of water, which must always be available during the growing season. The soil area adapted to rice in this valley is sufficiently large to produce many times the 55,000,000 pounds of cleaned rice which are consumed each year on the Pacific coast. How much of this area has sufficient available water for proper irrigation is uncertain, though for a good portion of it there is apparently an abundant supply. Increase in the rice acreage should therefore be made with care.*

Its culture has opened up a new industry for lands which have hitherto been deemed unfit for anything but wheat, on account of the adobe conditions of the soil. The time of harvest varies, according to the variety, from August to November.

In 1913 there were 6,200 acres of rice in California, all but about 150 acres in the Sacramento Valley. The results obtained were very good, the yield ranging from 2,500 to 5,000 pounds per acre, averaging about 3,200. About 1,000 acres were late and could not be threshed before the rains started in the fall.

Rice is grown successfully in the northern part of Kern County, on heavily laden alkali land which had hitherto been regarded as practically worthless. From 15 acres 349 sacks, weighing from 100 to 110 pounds, were produced, valued at 3 cents per pound.

In 1914 there were 16,000 acres in rice, compared with 6,200 the previous year. The average yield was about 2,800 pounds per acre, the total crop amounting to about 44,800,000 pounds, the quality being good and the average price about 2 cents per pound to the grower. About 1,750 acres were not harvested. Low yields and failures in some cases were due principally to late seeding and watering and damage caused by barnyard grass.

The following is the acreage of rice by counties in 1915:

Sacramento Valley	Acres	San Joaquin Valley	Acres
Butte County	15,200	San Joaquin County	150
Glenn County	500	Stanislaus County	200
Colusa County	8,750	Merced County	45
Yolo County	1,500	Fresno County	1,120
Yuba County	1,990	Tulare County	400
Shasta County	5	Kings County	300
Sutter County	850	Kern County	900
Solano County	180	Imperial County	10
		Ventura County	10
Total	28,975	Total	3,135
Total acreage in the State			32,110

There were six rice mills in the State in 1914 with a daily capacity of approximately 5,000 bags (100 pounds each) per day.

The mills handle the complete process from the time the rice leaves the threshing machine on the field until it is packed in 2½-pound cotton bags ready for retail consumption, both in the polished and unpolished. The by-products, such as bran and rice meal, are very nutritious for cattle and hog feed.

The only rice flour mill in the State is operated at Sacramento, and is competing successfully with the foreign product, which was shipped into the United States previously from Holland and Germany.

The growers received from $2.20 to $1.90 f.o.b. cars shipping point for the 1914 crop, per bag of 100 pounds. The total production of rice in the State in 1915 was approximately 888,000 sacks of 100 pounds each. The quality was good, and the price ranged from $1.70 to $2.00 per hundred, averaging about $1.85. The Pacific Rice Growers Association estimates that the acreage in 1916 will be nearly 100,000 acres.

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*Report on Rice Growing, Circular No. 97, U. S. Department of Agriculture.

TOBACCO.*

For several years extensive and exhaustive experiments in the production of tobacco from Turkish seed were carried on at the Exeter Tobacco Ranch in Tulare County. There have been a number of types of tobacco experimented with, but the types that have been attended with the greatest success are such as are suitable for cigarette manufacture. The tobacco raised during recent years has been produced about equally by Fresno and Tulare counties, the total quantity being 7,500 pounds in 1909; 15,000 in 1910; 45,000 in 1911, and 150,000 in 1912. The 1912 crop sold at from 30 cents to 60 cents per pound; most of it average 47½ cents. Some tobacco is also grown in Los Angeles County and the southern part of the State.

In 1913 the crop of leaf tobacco amounted to about 175,000 pounds, some of which it is stated was purchased by the eastern market. According to a leading authority, the crop was not as good as in former years, owing to the farmers planting too large an acreage and not being familiar with the culture of tobacco. The growers in Fresno County, where a considerable quantity has been produced, have experienced much difficulty in disposing of their crop at a fair price, so the cultivation of tobacco has declined.

It is reported that about a carload of tobacco mostly obtained from Fresno and Tulare counties has recently been shipped to Australia as an experiment, but the price paid for it can not be ascertained.

VEGETABLES.

The potato is the most important vegetable raised; the acreage in 1912 was 78,000, and the production 10,140,000 bushels, valued at $6,591,000, an average of 130 bushels to the acre.

Next to the Irish potato, the sweet potato is the most extensively grown vegetable in the United States. In California it is not cultivated on a large scale. In 1909, the acreage amounted to 5,111, with a production of 572,814 bushels. In 1915, the acreage was 6,000, yielding 135 bushels to the acre, the total production being 810,000 bushels.

Beans and Peas Produced, 1850-1910.†

(From the Bureau of the Census.)

Year	Beans, bushels	Peas, bushels
1850	2,292	
1860	165,574	
1870	380,010	
1880	378,971	40,806
1890	713,480	32,364
1900	658,515	57,299
1910	3,323,608	57,468

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*For the early experiments in growing tobacco in California, see the Report for 1913, page 82.

†Beans and peas were reported as one product in 1850, 1860, and 1870.

The acreage in beans in 1910 was 157,825, producing beans of the value of $6,292,955; the acreage in dry peas was 2,959, valued at $101,016.

Lima Beans.

Lima beans are only grown in any quantity in five counties, and have come into great favor in recent years. They were first cultivated in Carpinteria Valley about forty years ago, and after 1884 the growing extended. The bulk of the crop is raised in Ventura County; Orange, Santa Barbara, Los Angeles and San Diego counties being next in order. San Diego County, however, is increasing its acreage in lima beans very fast. Some of the best sections yield 40 to 45 sacks per acre. The average yield is 14 sacks of 80 pounds, or 1,120 pounds to the acre, but in the best sections 35 or even 40 sacks of 80 pounds to the acre have been raised.

In Ventura County the yield is not less than 20 80-pound sacks to the acre, whereas 12 sacks is considered a good yield in Orange County. The commercial production of dried lima beans is practically confined to the southern coast district of California, very few being produced in other states. The price paid to growers for lima beans the past season ranged from $4 to $4.60 per hundred, f.o.b. cars.

The other varieties of beans are grown mostly in the delta region of the Sacramento and San Joaquin rivers. The pink variety is grown generally in all the bean sections of California; the large white or Lady Washington in the Sacramento and San Joaquin river sections; the Blackeye is in realty a cowpea and is grown all over the State, but principally in the southern counties of Ventura, Riverside, Los Angeles, Orange and San Diego; and they are also grown in the San Joaquin Valley. The Bayo is not grown extensively, and is produced in a limited area of the choicest river bottom lands in the Sacramento and San Joaquin valley sections; the small white, or navy bean, is a late variety and grown mostly in the coastal counties of Monterey, San Luis Obispo and Santa Barbara. Large quantities are shipped to Boston, where they are prepared as ''Boston baked beans.''

Castor beans were first grown in Califorinia over forty years ago, without profit, and have never been profitable since that time. They are not edible, either by man or stock, their only use being for making oil.

North Carolina and Tennessee are the two leading states in the production of Soy beans, but they are not grown in California. They are not generally used as a human food in this country, although perfectly edible. Velvet beans are at present confined to a few of the Gulf states, and is the leading legume in Florida.

Beans have become one of the most important vegetable crops in the State.

California Beans, 1910-1915.

(Sacks.)

Variety	1910	1911	1912	1913	1914	1915
Limas*	1,175,000	1,300,000	1,200,000	1,050,000	1,500,000	1,800,000
Blackeyes	100,000	225,000	204,000	80,000	150,000	405,000
Large whites	150,000	75,000	63,000	115,000	100,000	155,000
Small whites	250,000	215,000	215,000	40,000	325,000	600,000
Bayos	75,000	150,000	65,000	60,000	75,000	85,000
Pinks	250,000	710,000	298,000	250,000	500,000	650,000
Various	100,000	150,000	118,000	120,000	125,000	98,000
Totals	2,100,000	2,825,000	2,163,000	1,715,000	2,775,000	3,793,000

*On the basis of bags of 80 pounds, although bags of 100 pounds are increasing every year.

California Bean Crop, 1905-1915, Imports and Exports.*

(Duty—beans, 25 cents per bushel of 60 pounds; dried peas, 10 cents per bushel; split peas, 20 cents per bushel.)

Year	California bean crop, bags	Exported†		Imported	
		Bushels	Value	Bushels	Value
1905	1,921,400	330,321	$730,922	472,572	$628,775
1906	1,779,000	447,474	960,710	458,041	667,214
1907	1,000,000	435,490	932,264	406,679	656,893
1908	1,929,000	306,939	708,201	1,657,401	2,406,935
1909	2,340,000	298,209	702,819	3,355,405	4,926,199
1910	1,950,000	365,721	973,231	1,015,157	1,621,207
1911	2,825,000	288,638	814,663	1,037,371	1,733,697
1912	2,013,000	341,268	1,011,466	1,004,930	1,857,220
1913	1,165,000	400,868	1,080,066	1,048,297	1,938,105
1914	2,905,000	314,655	875,493	1,634,070	2,955,663
1915	3,868,000	1,214,281	3,638,526	905,647	1,461,917

*For the production of dried beans and peas by counties, see page 108.
†In the exports dried peas are included in the total with beans.

Celery.

Celery is an important crop and was formerly grown on a large scale in Orange County, but owing to the blight it has ceased to be a commercial crop in this county, the growers turning to lima beans and sugar beets, which are more certain and less expensive to raise. A large quantity is raised near El Monte, in Los Angeles County, and also a large acreage near Stockton, in San Joaquin County, and also in Contra Costa and Sacramento counties. The 1915 price per dozen bunches was almost double that of 1914, owing to the fact that the eastern crop was almost an entire failure, the excessive rains causing blight.

Onions.

The onion crop the last two years has not changed much. San Joaquin, Contra Costa and Santa Barbara counties are the leading producers of onions. The total acreage and production the last two years has been as follows:

Year	Acreage	Yield per acre, bushels	Total production, bushels
1914	9,924	400	3,969,600
1915	8,128	375	3,048,000

The bulk of these crops of celery and onions are raised in San Joaquin and Sacramento counties. Cucumbers are mostly grown near Hayward and Niles, in Alameda County, and cabbage near Montebello, in Los Angeles County.

According to the figures of the California Vegetable Union, Los Angeles County leads in the production of cauliflower, cabbage, lettuce, tomatoes and mixed vegetables; San Joaquin in potatoes and onions; San Mateo in artichokes, and Sacramento in asparagus.

The annual average shipments are approximately as follows:

Vegetables	Number of cars	Average price paid to growers
Artichokes	150	25 cents to $1,00 per dozen.
Asparagus	350	3 cents to 4 cents per pound.
Celery	2,500	15 cents to 40 cents per dozen.
Cauliflower	800	15 cents to 60 cents per dozen.
Cabbage	1,000	$8.00 to $40.00 per ton.
Potatoes	10,000	50 cents to $2.00 per cwt.
Lettuce	300	8 cents to 25 cents per dozen.
Tomatoes	300	$15.00 to $30.00 per ton.
Onions	2,000	50 cents to $2.00 per cwt.
Mixed vegetables	1,000	

CANNED VEGETABLES.

California ranks first among the states in the production of canned asparagus, and sixth in that of canned tomatoes. The case which is used as the unit of measure consists of 24 standard-size cans No. 2 (also called 2-pound cans) for beans, peas, and No. 3 (also called 3-pound cans) for all other vegetables. Where the output has been reported in other forms by the canneries, the quantities have been reduced to standard cases.

The principal counties producing tomatoes are Los Angeles, Orange, Alameda, Santa Clara and Sonoma. There is also a considerable acreage in certain portions of the San Joaquin and Sacramento valleys. The average yield of tomatoes grown for the canneries varies from 8 to 10 tons. Under favorable conditions yields of from 15 to 20 tons, and occasionally of 25 tons per acre, are realized. The prices paid by the canneries vary from $6 to $8 per ton, while the prices paid in the fresh markets vary from $10 to $40 per ton.

The value of the vegetables canned increased throughout during the decade of 1899-1909; the rate of increase from 1904 to 1909 being much higher than that during the preceding five-year period. The value of canned asparagus formed over half of the value of all canned vegetables in 1909.

Canned Vegetables, 1899-1909.

(Compiled from the reports of the Bureau of the Census.)

Product	1899		1904		1909	
	Cases	Value	Cases	Value	Cases	Value
Asparagus					198,123	$1,794,346
Beans	34,209	$56,797	65,641	$133,494	47,525	$87,059
Peas	72,760	145,987	68,142	144,033	123,349	250,624
Pumpkins	1,033	1,860	18,852	30,156	11,694	15,165
Tomatoes	794,566	2,068,997	541,776	845,805	545,131	1,120,632
All other	148	396	286,172	1,213,173	65,812	202,795
Totals		$2,274,037		$2,366,661		$3,470,621

Duty on Imported Preserved Vegetables.

All kinds 25 per cent ad valorem.

Canned Vegetables, 1900-1915.

Year	California pack, cases	Exported value	Year	California pack, cases	Exported value
1900	803,617	$603,288	1908	1,501,885	$621,987
1901	1,076,058	528,914	1909	1,242,720	728,111
1902	1,151,268	560,612	1910	2,250,645	782,973
1903	1,343,574	597,759	1911	2,293,000	1,061,259
1904	961,783	719,580	1912	2,271,700	1,822,357
1905	1,192,455	580,048	1913	2,809,000	1,819,281
1906	1,747,595	658,739	1914	3,194,327	1,520,879
1907	1,941,755	598,628	1915	2,465,000	1,898,840

California Vegetable Pack by Varieties, 1911-1915.

(Cases.)

	1911	1912	1913	1914	1915*
Tomatoes	1,500,000	1,500,000	1,490,000	2,058,657	1,300,000
Peas	185,000	270,000	200,000	162,093	200,000
Asparagus	700,000	730,000	710,000	768,810	780,000
Spinach		16,500	16,000		17,000
Squash		21,000	19,000		18,000
Beans and other vegetables	130,000	172,500	156,000	204,767	150,000
Total vegetables	2,515,000	2,809,000	2,591,000	3,194,327	2,465,000
Total fruits and vegetables	6,684,023	7,739,150	6,606,500	9,320,396	8,078,000

*Estimated.

In 1909 the total acreage of potatoes and other vegetables was 151,962 and their value $12,121,958. Excluding potatoes and sweet potatoes the acreage of vegetables was 79,163 and their value $6,887,000, both being more than twice as great as in 1899. The above table distinguishes between farms which make the raising of vegetables a business of some importance, and others on most of which vegetables are raised mainly for home consumption.

GINSENG IN CALIFORNIA.*

Many demands are made for information regarding the cultivation of this plant, many appearing to believe that owing to its high price it must be an exceedingly profitable crop, but it offers little inducement for inexperienced growers looking for quick profits from a small investment. The plant takes eighteen months to germinate, and six years to mature; it requires good soil, shade, and careful cultivation. Last year in the San Francisco market it brought from $4 to $7 per pound, according to grade.

The market rates per pound on December 31, 1913, were $12.50 gold for extra and selected, $11 for good root, and $9.55 for fair root, as compared with $10.10, $9 and $7.87 per pound on December 31, 1912.

The rates for cultivated root during 1913 varied from $2.20 to $11 gold per pound, depending upon quality and condition. A large portion of the American imports were sold as of too poor a quality to be graded in the usual manner. The necessity of preparing root in accordance with Chinese ideas, rather than American ideas of what the Chinese ought to want, must not be forgotton.†

Ginseng is only cultivated in small lots, the total acreage in the United States in 1910, was only 23 acres, the value of the Ginseng produced was $151,888.

Exports of Ginseng From the United States, 1908-1915.

Year	Pounds	Value	Year	Pounds	Value
1908	154,180	$1,111,994	1912	155,308	$1,119,301
1909	186.257	1,270,632	1913	221,901	1.665,731
1910	192,406	1,439,434	1914	224,605	1,832,686
1911	153,999	1,088,202	1915	103,184	919,931

Ginseng is shipped to Hongkong, where a syndicate of Chinese merchants control almost the entire ginseng trade of China, receiving the importations and distributing them throughout the country.

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*For a full description of the cultivation and prices of ginseng, see Report for 1913. pages 85–86.

†Consular Reports, March, 1914.

Vegetables, Flowers and Plants and Nursery Products, 1899-1909.

(Compiled from the reports of the Bureau of the Census.)

Crop	Number of farms	Acres 1899	Acres 1909	Value of products 1899	Value of products 1909
Vegetables other than potatoes and sweet potatoes	*33,755	32,401	79,163	$2,858,832	$6,886,885
Farms reporting a product of $500 or over	2,075	--------	53,369	-----------	4,836,001
All other farms	31,680	--------	25,794	-----------	2,050,884
Flowers and plants, total	442	672	1,013	580,646	1,388,513
Farms reporting a product of $250 or over	347	--------	--------	-----------	1,373,577
All other farms	95	--------	--------	-----------	14,936
Nursery products, total	566	2,914	4,803	558,329	2,212,788
Farms reporting a product of $250 or over	296	--------	--------	-----------	2,134,713
All other farms	270	--------	--------	-----------	78,075

*Not including 9,393 farms that had vegetable gardens, but gave no information as to their products.

FLOWERS, PLANTS, AND NURSERY PRODUCTS.

The choice of crops by the florist is largely influenced by changes in popular taste, the camellia, which was the most popular flower years ago, having been superseded in recent years by the rose, carnation, violet, chrysanthemum, and lily of the valley. There is also a growing demand for orchids.

The raising of flowers and plants and of nursery products is also of considerable importance in California, 5,816 acres being devoted to them in 1909, and the output being valued at $3,601,301. Most of the product was raised on farms where these branches of agriculture were carried on as an important business.

In 1909, a total of 96,230,420 square feet, or over 2,200 acres, of land under glass was reported in the United States.

In California, 430 farms reported as florists' establishments, with 1,572,480 square feet under glass.

There is comparatively little land under glass in California, compared with the eastern states, as the climate does not require it.

TABLE A.

(From Circular No. 121, October, 1914, of the University of California.)

Average, Probable and Possible Yields.*

	Average yield per acre	A safe estimate for business purposes	A good yield which competent men may hope to obtain	Yield not infrequently obtained under favorable conditions	Possible but extraordinary yield
Wheat, bushels	13	20	25	40	50
Oats, bushels	31	45	60	90	120
Barley, bushels	25	40	50	75	100
Potatoes, bushels	125	175	200	300	500
Alfalfa, tons	3.5	5.0	6.0	9.0	12.0
Grain hay, tons	1.25	1.75	2.0	3.0	4.0
Cotton, Durango, lbs.	300	400	500	800	1200
Rice, rough, lbs.	1500	2200	3000	4500	6000
Hops, lbs.	1500	1800	2200	3000	8000
Beans, field, lbs.	1100	1200	1400	2500	3000
Onions, sacks	100	150	250	300	400
Sugar beets, tons	9	13	18	25	30
Butter fat, per cow, lbs.	150	225	300	350	400
Oranges, boxes	150	225	300	450	600
Lemons, boxes	175	225	300	450	600
Raisins, Muscat, tons	0.5	0.75	1.00	1.25	2.00
Raisins, Seedless, tons	0.75	1.00	1.25	1.50	3.00
Grapes, shipping, tons	3.0	5.0	7.0	10.0	15.0
Grapes, Interior, wine, tons	3.0	5.0	7.0	10.0	15.0
Grapes, Coast, wine, tons	1.5	3.0	5.0	7.0	10.0
Olives, tons	1.0	1.50	2.0	3.0	5.0
Walnuts, tons	0.4	0.5	.75	1.0	1.5
Almonds, tons	0.4	0.5	.75	1.0	1.25
Prunes, dried, tons	1.25	1.75	2.5	3.0	5.0
Plums, shipping, crates	250	350	450	650	850
Apricots, dried, tons	0.75	1.0	1.25	1.75	2.5
Apricots, shipping, crates	250	350	450	650	850
Pears, tons	4.0	5.0	7.0	10.0	12.0
Peaches, dried, tons	0.75	1.0	1.5	2.0	3.0
Peaches, shipping, boxes	300	400	600	800	1000
Apples, boxes	200	300	500	900	1200
Cherries, tons	1.25	2.0	2.5	5.0	8.0

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*In California the pounds per bushel are: Barley, 50; corn, 52; oats, 32; and wheat, 60.

The sack equivalent in pounds is neither uniform nor standardized. The variation is due to the fullness of the bags and the volume weight of the grain.

Good plump barley	110–115 pounds per sack
Second class barley	100 pounds per sack
Heavy extra wheat	125–150 pounds per sack
Average wheat	120–135 pounds per sack
Heavy oats in barley bags	100 pounds per sack
Light oats in barley bags	85– 90 pounds per sack
Oats in regular oat bags, about	125 pounds per sack
Beans	80–100 pounds per sack
Potatoes	110–120 pounds per sack

TABLE B.

(From Circular No. 121, October, 1914, of the University of California.)

ILLUSTRATIONS OF SIZE OF FARM.

Table showing the area required to produce a gross income of $4,000 per year, assuming the average price stated. The yield assumed is stated in column 2, Table A, under the heading—A Safe Estimate for Business Purposes. Figures are not official.

	Low price, dollars and cents	High price, dollars and cents	Average price, dollars and cents	Size of farm necessary to obtain gross income of $4,000, acres
Wheat, bushels	$0 70	$1 00	$0 85	235
Oats, bushels	40	65	55	161
Barley, bushels	50	75	60	167
Potatoes, bushels	50	90	70	33
Alfalfa, tons	5 00	12 00	8 00	100
Grain hay, tons	6 00	15 00	10 00	229
Cotton, Durango, pounds	11	17	14	71
Rice, rough, pounds	01	03	02	91
Hops, pounds	10	30	17	13
Beans, field, pounds	03	05	04	83
Onions, sacks	50	2 00	80	33
Sugar beets, tons	4 50	6 00	5 50	56
Butter fat, pounds	25	40	33	60
Oranges, boxes	50	2 50	1 50	12
Lemons, boxes	75	3 00	2 00	9
Raisins, Muscat, pounds	02	05	03	89
Raisins, Seedless, pounds	025	06	04	50
Grapes, shipping, tons	7 00	60 00	20 00	40
Grapes, Interior, wine, tons	7 00	18 00	15 00	53
Grapes, Coast, wine, tons	12 00	30 00	23 00	58
Olives, oil, tons	40 00	50 00	45 00	59
Olives, pickling, tons	80 00	200 00	150 00	18
Walnuts, pounds	10	15	12	33
Almonds, tons	160 00	340 00	280 00	29
Prunes, dried, tons	50 00	120 00	80 00	29
Plums, shipping, crates	45	1 25	60	19
Apricots, dried, tons	120 00	300 00	180 00	22
Apricots, shipping, crates	50	1 50	75	15
Pears, tons	20 00	60 00	40 00	20
Peaches, dried, tons	70 00	200 00	105 00	38
Peaches, shipping, boxes	25	1 00	40	25
Apples, boxes	40	1 50	65	20
Cherries, shipping, tons	100 00	300 00	200 00	10

CALIFORNIA FARM CROPS FOR TWENTY-FIVE YEARS
1890-1915.

Barley, Buckwheat, Corn, Oats, Rye, Wheat, Potatoes, Hay.*

(Compiled from the Reports of the United States Department of Agriculture.)

California Barley Crops, 1890-1915.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	677,276	22.3	15,103,255	$0 75	$11,327,441
1891	812,731	23.7	19,261,725	61	11,749,652
1892	845,240	24.0	20,285,760	47	9,534,307
1893	760,716	22.5	17,116,110	42	7,188,766
1894	737,895	15.2	11,216,004	45	5,047,202
1895	937,127	20.3	19,023,678	40	7,609,471
1896	918,384	21.6	19,837,094	48	9,521,805
1897	881,649	23.0	20,277,927	54	10,950,081
1898	872,833	10.5	9,164,746	65	5,957,085
1899	855,376	26.0	22,239,776	50	11,119,888
1900	889,591	16.7	14,856,170	43	6,388,153
1901	1,089,785	26.0	28,334,410	41	11,617,108
1902	1,144,274	26.0	29,751,124	63	18,743,208
1903	1,201,488	25.7	30,878,242	61	18,835,728
1904	1,237,533	22.7	28,091,999	60	16,855,199
1905	1,237,533	21.5	26,606,960	59	15,698,106
1906	1,425,000	27.2	38,760,000	54	20,930,400
1907	1,040,000	28.9	30,056,000	78	23,444,000
1908	1,082,000	23.5	25,427,000	74	18,816,000
1909	1,180,000	26.5	31,270,000	74	23,140,000
1910	1,500,000	31.0	46,500,000	55	25,575,000
1911	1,450,000	28.0	40,600,000	85	34,510,000
1912	1,392,000	30.0	41,760,000	70	29,232,000
1913	1,275,000	26.0	33,150,000	68	22,542,000
1914	1,402,000	30.0	42,060,000	59	24,815,000
1915	1,360,000	29.0	39,440,000	62	24,453,000

*For production of these crops by counties, see pages 104-107.

Exports of domestic barley in 1914, 6,644,747 bushels, and in 1915, 26,754,522 bushels; value $18,184,079.

Duty on Imported Cereals, Potatoes, and Hay.

Barley	15c per bushel of 48 pounds	Oats	6c per bushel of 32 pounds
Wheat	free	Rye	free
Buckwheat	free	Potatoes	free
Corn	free	Hay	$2.00 per ton
Wheat flour	free		

NOTE.—The imports of breadstuffs are comparatively small. In 1914 the quantities were: Corn, 12,367,369 bushels; oats, 22,273,624 bushels; wheat, 1,978,937 bushels; and wheat flour, 89,911 barrels.

The crops of barley, buckwheat, corn, oats, rye, wheat, potatoes and hay, from 1868–1903, will be found in the Report for 1913, pages 88-95.

California Buckwheat Crops, 1890-1896.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	677	14.5	9,816	$0 73	$7,166
1891	683	15.3	10,450	58	8,051
1892	697	16.5	11,500	53	6,141
1893	691	21.5	14,857	71	10,548
1894	691	18.0	12,438	45	5,597
1895	726	30.0	21,780	64	13,939
1896	690	18.7	12,903	39	5,032

NOTE.—The production of buckwheat is so small that it has not been recorded in recent years, the area being only a few hundred acres. The crop is raised in any quantity in only twenty-four states. Very little is exported. The acreage in buckwheat in 1910 was only 849, producing 14,681 bushels. The exports of buckwheat in 1914 were 580 bushels, and in 1915, 413,643 bushels.

California Corn Crops, 1890-1915.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	159,871	27.5	4,396,000	$0 65	$2,857,694
1891	161,470	34.5	5,571,000	71	3,955,208
1892	72,500	30.3	2,197,000	55	1,208,213
1893	71,775	37.1	2,275,268	50	1,137,634
1894	66,751	19.3	1,288,294	57	734,328
1895	65,416	34.5	2,256,852	53	1,196,132
1896	59,529	37.0	2,202,573	53	1,167,364
1897	60,720	31.5	1,912,680	56	1,071,101
1898	45,540	26.0	1,184,040	62	734,105
1899	56,925	27.0	1,536,975	60	922,185
1900	54,079	25.0	1,351,975	61	824,705
1901	59,703	31.0	1,850,793	68	1,258,539
1902	60,300	30.5	1,839,150	77	1,416,146
1903	57,888	30.7	1,777,162	74	1,315,100
1904	54,415	28.0	1,556,269	78	1,213,890
1905	56,592	32.0	1,810,944	76	1,376,317
1906	57,158	34.9	1,994,814	67	1,336,525
1907	54,000	34.0	1,836,000	85	1,561,000
1908	50,000	32.0	1,600,000	88	1,408,000
1909	50,000	34.8	1,740,000	91	1,583,000
1910	50,000	37.5	1,875,000	80	1,500,000
1911	51,000	36.0	1,836,000	90	1,652,000
1912	52,000	37.0	1,924,000	85	1,635,000
1913	55,000	33.0	1,815,000	88	1,597,000
1914	60,000	36.0	2,160,000	87	1,879,000
1915	64,000	41.0	2,624,000	88	2,309,000

Exports of domestic corn in 1914 were 9,380,855 bushels, value, $7,008,028; and in 1915, 48,786,291 bushels, value $39,339,064.

California Oat Crops, 1890-1915.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	70,655	27.5	1,943,000	$0 56	$1,088,087
1891	84,786	28.5	2,416,000	60	1,449,841
1892	67,829	29.3	1,987,000	40	794,956
1893	59,011	25.5	1,504,781	38	571,817
1894	57,831	35.6	2,058,784	44	905,865
1895	60,144	28.1	1,690,046	39	659,118
1896	58,941	31.0	1,827,171	44	803,955
1897	57,173	18.0	1,029,114	49	504,266
1898	58,888	33.0	1,943,304	50	971,652
1899	59,477	31.0	1,843,787	47	866,580
1900	60,072	24.6	1,477,771	46	679,775
1901	160,768	30.4	4,887,347	44	2,150,433
1902	168,806	30.5	5,148,583	51	2,625,777
1903	165,430	34.8	5,756,964	54	3,108,761
1904	167,084	34.1	5,697,564	57	3,247,611
1905	168,755	28.0	4,725,140	51	2,409,821
1906	163,692	31.5	5,156,298	52	2,681,275
1907	136,000	33.5	4,556,000	71	3,235,000
1908	200,000	33.5	6,700,000	67	4,489,000
1909	200,000	31.4	6,280,000	66	4,145,000
1910	200,000	37.0	7,400,000	50	3,700,000
1911	210,000	34.0	7,140,000	59	4,213,000
1912	200,000	39.0	7,800,000	55	4,290,000
1913	210,000	31.6	6,636,000	60	3,982,000
1914	220,000	35.0	7,700,000	53	4,081,000
1915	211,000	33.0	6,963,000	50	3,482,000

The exports of domestic oats in 1914 were 1,859,949 bushels, valued at $757,527; and in 1915, 96,809,551 bushels, valued at $57,469,964.

California Rye Crops, 1890-1915.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	27,413	14.0	383,782	$0 70	$268,647
1891	27,961	16.5	461,357	90	415,221
1892	28,800	11.5	331,200	67	221,904
1893	28,800	17.5	504,000	60	302,400
1894	29,376	13.2	387,763	60	232,658
1895	36,720	11.6	425,952	58	247,052
1896	38,556	14.5	559,062	60	335,437
1897	40,484	12.2	493,905	65	321,038
1898	40,079	9.0	360,711	70	252,498
1899	36,472	15.0	547,080	78	426,722
1900	38,660	13.0	502,580	58	291,496
1901	66,087	12.8	845,914	57	482,171
1902	67,409	12.0	808,908	75	606,681
1903	68,083	12.3	837,421	77	644,814
1904	67,402	7.6	512,255	78	399,559
1905	67,402	13.0	876,226	77	674,694
1906	62,684	12.8	802,355	71	569,672
1907	65,800	19.0	1,251,000	85	1,063,000
1908	66,000	12.0	792,000	88	697,000
1909	61,000	13.8	842,000	1 04	876,000
1910	7,000	17.0	119,000	86	102,000
1911	8,000	17.0	136,000	85	116,000
1912	8,000	17.6	141,000	90	127,000
1913	8,000	15.0	120,000	75	90,000
1914	8,000	17.0	136,000	85	116,000
1915	8,000	14.0	112,000	90	101,000

The exports of domestic rye in 1914 were 2,222,934 bushels, value $1,555,912; and in 1915, 12,544,888 bushels, valued at $14,733,409.

California Wheat Crops, 1890-1915.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	2,426,730	12.0	29,121,000	$0 76	$22,131,778
1891	2,815,007	13.0	36,595,000	95	34,765,336
1892	3,012,057	13.0	39,157,000	68	26,626,584
1893	2,620,490	13.3	34,852,517	53	18,471,834
1894	2,688,204	11.3	30,576,705	57	17,314,722
1895	3,084,446	13.0	40,097,798	60	24,058,679
1896	3,088,849	14.6	45,097,195	83	37,430,672
1897	3,239,402	10.0	32,394,020	83	26,887,037
1898	1,343,341	9.1	12,224,405	72	8,801,570
1899	2,393,185	14.1	33,743,909	62	20,921,223
1900	2,771,226	10.3	28,543,628	58	16,555,304
1901	2,672,547	13.0	34,743,111	60	20,845,847
1902	2,052,679	10.9	22,374,201	80	17,899.361
1903	1,868,410	11.2	20,926,192	87	18,205,787
1904	1,618,043	10.8	17,474,864	88	15,377,880
1905	1,886,238	9.3	17,542,013	82	14,384,451
1906	1,572,144	17.1	26,883,662	75	20,162,746
1907	1,368,000	15.0	20,520,000	98	20,110,000
1908	800,000	14.6	11,680,000	1 02	11,914,000
1909	825,000	14.0	11,550,000	1 11	12,820,000
1910	550,000	18.0	9,900,000	94	9,306,000
1911	480,000	18.0	8,640,000	88	7,603,000
1912	370,000	17.0	6,290,000	93	5,850,000
1913	300,000	14.0	4,200,000	95	3,990,000
1914	400,000	17 0	6,800,000	1 04	7,072,000
1915	440,000	16.0	7,040,000	95	6,688,000

Note.—All winter wheat; no spring wheat grown in California.

The exports of domestic wheat in 1914 were 92,393,775 bushels, value $87,953,456; and in 1915, 259,642,533 bushels, valued at $333,552,226.

California Potato Crops, 1890-1915.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	39,655	95	3,767,225	$0 68	$2,561,713
1891	41,241	95	3,918,465	54	2,115,971
1892	38,354	75	2,876,550	59	1,697,164
1893	37,203	96	3,571,488	50	1,785,744
1894	26,786	52	1,392,872	49	682,507
1895	25,179	75	1,888,425	48	906,444
1896	22,158	80	1,772,640	53	939,499
1897	21,493	105	2,256,765	49	1,105,815
1898	20,418	95	1,939,710	55	1,066.840
1899	26,543	119	3,158,617	63	1,989,929
1900	26,808	104	2,788,032	53	1,477,657
1901	45,259	101	4,571,159	77	3,519,792
1902	47.975	118	5,661,050	58	3,283,409
1903	46,536	130	6,049,680	66	3,992,789
1904	47,001	129	6,063,129	67	4,062,296
1905	50,291	165	8,298,015	67	5,559,670
1906	50,291	125	6,286,375	74	4,651,918
1907	48,000	145	6,900,000	90	6,264,000
1908	49,000	107	5,243,000	77	4,037,000
1909	60,000	130	7,800,000	77	6,006,000
1910	70,000	130	9,100,000	85	7,735,000
1911	72,000	135	9,720,000	90	8,748,000
1912	78,000	130	10,140,000	65	6,591,000
1913	68,000	119	8,092,000	70	5,664,000
1914	75,000	138	10,350,000	70	7,245,000
1915	78,000	130	10,140,000	75	7,605,000

The imports of potatoes generally averaged less than half a million bushels, until 1913; in 1914 the quantity was 3,645,993 bushels, value $1,763,782. The exports of domestic potatoes in 1913 amounted to 2,028,261 bushels, value $1,646,176, and in 1914, 1,794,073 bushels, value $1,463,514. In 1915 the imports were 130,587 bushels, and the exports 3,135,474 bushels, valued at $2,345,731.

California Hay Crops, 1890-1915.

Year	Acreage	Average yield per acre, tons	Production, tons	Average farm price, December 1	Farm value, December 1
1890	1,412,676	1.40	1,977,746	$10 50	$20,766,333
1891	1,497,437	1.40	2,096,412	11 00	23,060,532
1892	1,617,232	1.50	2,425,848	8 76	21,250,428
1893	1,681,921	1.69	2,842,446	7 87	22,370,050
1894	1,665,102	1.93	3,213,647	9 50	30,529,647
1895	1,681,753	1.66	2,791,710	7 06	19,709,473
1896	1,732.206	1.65	2,858,140	6 35	18,149,189
1897	1,697.562	1.60	2,716,099	9 00	24,441,891
1898	1,459,903	1.60	2,335,845	14 25	33,285,791
1899	1,708,087	1.63	2,784,182	8 00	22,273,456
1900	793,491	1.51	1,708,171	8 15	22,071,594
1901	550,325	1.82	1,001,592	7 92	7,932,609
1902	555,828	1.81	1,006,049	9 41	9,466,921
1903	550,270	2.08	1,144,562	11 66	13,345,593
1904	583,266	2.03	1,184,071	10 41	12,326,179
1905	589,119	2.40	1,413,886	10 05	14,209,551
1906	612.684	1.85	1,133,465	11 25	12,751,481
1907	637,000	1.75	1,115,000	12 50	13,938,000
1908	605,000	1.35	817,000	13 25	10,825,000
1909	650,000	1.70	1,105,000	11 50	12,708,000
1910	2,400.000	1.83	4,392,000	9 60	*42,163,000
1911	2,500,000	1.75	4,375,000	10 90	*47,688,000
1912	2,500,000	1.53	3,825,000	13 70	*52,402,000
1913	2.400,000	1.50	3,600,000	13 50	48.600,000
1914	2,700,000	1.95	5,265,000	8 20	43,173,000
1915	2,511,000	1.80	4,520,000	11 20	50,624,000

*Including forage.

The imports and exports of hay are not large. In 1914, 170,786 tons were imported, and in 1915 only 20,187, value $1,634,390. The exports were 50,151 tons in 1914, value $827,205, and 105,508 tons in 1915, value $1,980,297.

See note on page 76.

TABLE XXI.

Value of All Crops.

(From Census Reports in 1909.)

County	Cereals	Other grains and seeds	Hay and forage	Vegetables	Fruits and nuts	All other crops	Total
Alameda	$394,907 00	$31,257 00	$1,547,119 00	$810,628 00	$860,977 00	$686,079 00	$4,276,967 00
Alpine	25,833 00	8 00	49,147 00	3,291 00	1,444 00	3,483 00	83,206 00
Amador	55,405 00	90 00	229,982 00	41,583 00	59,599 00	65,651 00	452,270 00
Butte	556,107 00	767 00	806,735 00	55,314 00	797,893 00	147,699 00	2,364,515 00
Calaveras	7,881 00	755 00	217,191 00	58,093 00	53,368 00	71,880 00	409,168 00
Colusa	1,578,543 00	36,023 00	340,462 00	30,458 00	129,389 00	49,424 00	2,164,299 00
Contra Costa	604,035 00	104,487 00	1,617,610 00	1,125,668 00	499,436 00	80,818 00	4,032,054 00
Del Norte	8,877 00	164 00	85,763 00	10,605 00	2,878 00	3,665 00	111,952 00
El Dorado	15,189 00	120 00	196,638 00	41,950 00	143,924 00	73,693 00	471,514 00
Fresno	510,053 00	13,685 00	1,702,818 00	108,690 00	5,279,794 00	376,147 00	7,991,187 00
Glenn	909,796 00	700 00	327,008 00	13,644 00	35,661 00	64,101 00	1,350,910 00
Humboldt	117,802 00	19,249 00	893,913 00	175,817 00	141,493 00	90,151 00	1,438,425 00
Imperial	755,239 00	----------	802,990 00	295,389 00	26,864 00	20,876 00	1,901,358 00
Inyo	156,416 00	3,496 00	252,610 00	57,314 00	44,047 00	18,760 00	532,643 00
Kern	500,973 00	13,580 00	953,044 00	96,968 00	159,698 00	78,992 00	1,803,255 00
Kings	550,869 00	20,704 00	1,171,101 00	140,137 00	1,219,568 00	77,735 00	3,180,114 00
Lake	129,857 00	17,641 00	196,995 00	44,701 00	90,001 00	38,601 00	517,796 00
Lassen	214,275 00	20,267 00	582,371 00	51,047 00	16,304 00	13,685 00	897,949 00
Los Angeles	806,507 00	218,428 00	3,430,698 00	1,255,093 00	6,731,532 00	2,278,626 00	14,720,884 00
Madera	1,220,003 00	900 00	290,258 00	27,995 00	126,124 00	21,138 00	1,686,418 00
Marin	19,766 00	15 00	425,987 00	42,916 00	31,816 00	13,883 00	534,383 00
Mariposa	18,515 00	1,430 00	109,699 00	28,024 00	43,025 00	29,939 00	230,632 00
Mendocino	175,678 00	927 00	526,680 00	121,941 00	166,534 00	540,218 00	1,531,986 00
Merced	1,691,556 00	11,251 00	1,355,098 00	187,563 00	147,964 00	30,142 00	3,423,574 00
Modoc	329,318 00	59,506 00	621,177 00	98,574 00	49,894 00	17,569 00	1,176,038 00
Mono	5,023 00	552 00	85,083 00	13,396 00	3,038 00	665 00	107,757 00
Monterey	1,695,220 00	57,676 00	1,125,740 00	330,296 00	438,763 00	677,840 00	4,325,535 00
Napa	168,471 00	6,224 00	465,362 00	126,348 00	766,745 00	104,292 00	1,637,442 00
Nevada	3,101 00	58 00	159,879 00	54,554 00	89,771 00	78,963 00	386,326 00
Orange	562,563 00	653,763 00	976,896 00	540,864 00	2,497,734 00	944,517 00	6,176,337 00
Placer	104,677 00	----------	194,464 00	52,253 00	1,318,731 00	143,294 00	1,813,419 00
Plumas	74,736 00	----------	299,817 00	21,772 00	3,872 00	32,722 00	432,919 00
Riverside	895,051 00	10,180 00	1,624,675 00	133,199 00	2,393,371 00	77,100 00	5,133,576 00
Sacramento	232,584 00	405,143 00	786,239 00	509,231 00	2,265,690 00	521,123 00	4,720,010 00
San Benito	268,068 00	138,590 00	963,249 00	34,425 00	281,891 00	54,932 00	1,741,155 00
San Bernardino	93,464 00	1,097 00	932,249 00	107,283 00	5,357,098 00	327,042 00	6,818,233 00

San Diego	458,836 00	91,268 00	1,110,127 00	174,869 00	941,767 00	84,269 00	2,861.136 00
San Francisco		3,310 00	1,460 00	190,965 00	920 00	127,271 00	323,926 00
San Joaquin	3,238,767 00	533,977 00	1,763,286 00	2,149,300 00	1,307,448 00	89,462 00	9,082,240 00
San Luis Obispo	869,268 00	517,452 00	681,886 00	141,685 00	155,094 00	116,427 00	2,481,812 00
San Mateo	260,218 00	36,742 00	361,266 00	459,470 00	73,272 00	204,403 00	1,395,371 00
Santa Barbara	585,079 00	869,908 00	771,922 00	244,205 00	538,465 00	558,671 00	3.568.250 00
Santa Clara	170,190 00	265,665 00	1,587,494 00	450,065 00	4,234,874 00	260,150 00	6,968,438 00
Santa Cruz	94,360 00	24,514 00	327,572 00	164,518 00	1,656,212 00	141,259 00	2,408,435 00
Shasta	74,831 00	1,719 00	410,532 00	85,381 00	248.442 00	118,890 00	939,795 00
Sierra	25,769 00		180,874 00	12,369 00	7,618 00	7,524 00	234,154 00
Siskiyou	325,312 00	6,972 00	851,817 00	130,817 00	41,170 00	70,306 00	1,426,394 00
Solano	1,292,481 00	103,660 00	572,822 00	84,337 00	1,495,713 00	20,953 00	3,569,966 00
Sonoma	50,993 00	809 00	1,170,906 00	185,749 00	2,034,805 00	1,008,116 00	4,451,378 00
Stanislaus	1,315,180 00	17,411 00	1,424,229 00	181,282 00	207,508 00	53,050 00	3,198,660 00
Sutter	588,103 00	150,486 00	419,331 00	57,368 00	470,985 00	63,149 00	1,749,422 00
Tehama	249,157 00	756 00	376,843 00	46,108 00	428,108 00	127,278 00	1,228,250 00
Trinity	12,394 00	604 00	167,713 00	58,211 00	11,874 00	18,549 00	269,345 00
Tulare	1,442,685 00	17,311 00	1,362,609 00	192,030 00	2,053,596 00	285,763 00	5,353,994 00
Tuolumne	14,453 00	183 00	167,810 00	39,885 00	31,044 00	44,121 00	297,496 00
Ventura	347,954 00	2,711,809 00	931,688 00	61,878 00	1,795,606 00	902,824 00	6,751,759 00
Yolo	1,032,710 00	112,847 00	984,115 00	126,359 00	677,099 00	341,320 00	3,274,450 00
Yuba	134,728 00	2,075 00	214,158 00	38,083 00	73,358 00	237,734 00	700,136 00
Totals	$28,039,826 00	$7,318,211 00	$42,187,215 00	$12,121,958 00	$50,706,869 00	$12,736,934 00	$153,111,013 00

FARM CROPS BY COUNTIES.

CEREALS.

Barley, Corn, Oats, Rye, Wheat, Potatoes, Hay and Forage, in 1910.
(Compiled from the reports of the Bureau of the Census.)

TABLE XXII.

Barley, Corn, and Oats.

County	Barley		Corn		Oats	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
Alameda	12,650	473,575	503	13,097	1,725	53,745
Alpine	38	1,480	----------	----------	135	7,274
Amador	1,513	29,071	301	12,526	1,354	30,813
Butte	17,705	326,447	359	14,856	1,432	54,685
Calaveras	222	4,833	80	1,776	108	2,121
Colusa	89,985	1,949,223	706	16,619	771	12,556
Contra Costa	18,665	731,970	263	6,158	1,112	40,178
Del Norte	32	840	1	12	216	12,078
El Dorado	50	884	38	768	543	10,504
Fresno	32,132	694,234	1,422	37,726	1,554	20,027
Glenn	53,513	1,002,587	671	21,999	1,283	32,620
Humboldt	1,296	65,991	253	7,633	2,823	75,803
Imperial	36,986	908,916	690	14,419	30	372
Inyo	678	19,381	1,883	57,917	573	28,875
Kern	32,492	517,029	466	7,132	82	770
Kings	19,287	402,432	2,274	43,688	109	4,490
Lake	2,825	54,758	981	26,317	843	19,914
Lassen	3,244	63,471	4	93	977	25,647
Los Angeles	32,804	785,129	9,084	249,295	973	38,720
Madera	90,341	1,170,945	1	50	10,569	175,047
Marin	16	231	52	2,061	850	31,430
Mariposa	1,434	19,130	174	2,330	55	1,100
Mendocino	1,904	43,370	533	14,454	3,087	81,959
Merced	88,145	2,009,531	1,877	52,778	19,843	338,041
Modoc	8,650	227,473	6	209	728	22,138
Mono	----------	----------	4	160	42	3,000
Monterey	98,923	2,026,334	845	15,552	8,734	240,760
Napa	3,048	58,300	2,389	59,579	1,366	32,155
Nevada	30	249	5	208	119	1,559
Orange	27,384	671,526	3,054	91,643	995	30,858
Placer	1,318	17,128	27	1,055	3,030	40,397
Plumas	1,260	12,216	----------	----------	2,193	75,606
Riverside	56,946	958,526	372	12,421	3,767	85,540
Sacramento	4,599	75,575	795	34,089	4,174	66,949
San Benito	10,955	307,215	401	5,389	776	13,826
San Bernardino	3,260	85,480	920	14,839	436	16,598
San Diego	17,745	284,677	4,544	71,874	7,690	177,485
San Francisco	----------	----------	----------	----------	----------	----------
San Joaquin	125,114	3,827,187	2,547	57,028	23,208	396,661
San Luis Obispo	26,370	667,718	1,509	24,015	1,139	35,884
San Mateo	917	26,001	11	164	16,125	462,566
Santa Barbara	26,294	683,605	1,240	25,979	9,494	233,171
Santa Clara	8,903	200,893	411	9,791	247	9,424
Santa Cruz	1,000	34,226	1,136	22,284	2,282	59,812
Shasta	1,298	21,551	163	4,655	723	8,915
Sierra	466	7,362	1	40	526	11,431
Siskiyou	4,282	60,118	89	3,165	3,148	93,076
Solano	41,647	1,263,357	91	935	1,306	25,711
Sonoma	361	8,795	1,681	44,331	468	20,156
Stanislaus	57,529	828,628	662	12,297	38,546	688,542
Sutter	27,457	491,720	761	22,373	3,568	56,823
Tehama	11,402	177,518	100	2,613	1,032	28,138
Trinity	39	1,210	51	1,833	150	2,667
Tulare	27,017	553,481	2,527	61,757	1,281	25,524
Tuolumne	579	5,055	7	156	425	7,447
Ventura	10,077	309,682	2,409	58,995	1,138	27,901
Yolo	49,530	1,236,884	201	5,123	515	12,365
Yuba	2,801	36,806	360	5,645	1,740	31,834
Totals	1,195,158	26,441,954	51,935	1,273,901	192,158	4,143,688

NOTE.—The acreage in buckwheat in 1910 was only 849, producing 14,681 bushels.

TABLE XXIII.

Rye, Wheat, Kaffir Corn, and Milo Maize.

County	Rye		Wheat		Kaffir corn and Milo maize	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
Alameda			1,075	21,535		10
Alpine			618	19,464		
Amador			293	5,169		
Butte			20,894	245,743	409	9,529
Calaveras			51	439	5	48
Colusa	77	987	11,168	221,549	2,598	48,418
Contra Costa			2,443	53,332		
Del Norte	2	112				
El Dorado	117	609	193	3,201		
Fresno	100	1,000-	7,829	97,391	1,689	37,506
Glenn			17,541	232,911	162	4,972
Humboldt	14	181	134	3,370		
Imperial			125	2,559	9,789	213,781
Inyo			1,715	50,858		
Kern	30	1,500	12,924	139,375	2,813	45,828
Kings	5	100	8,684	141,978	3,931	95,010
Lake	7	140	2,563	46,131		
Lassen	526	6,018	9,938	153,863		
Los Angeles	100	745	6,760	59,866	166	2,145
Madera	100	1,400	39,468	370,499	343	4,948
Marin			57	1.155		
Mariposa	20	240	124	1,298		
Mendocino	3	61	3.906	59,195		
Merced	2,108	19,917	10,399	115,938	2,206	45,770
Modoc	406	6,633	9,362	195,924		
Mono	4	40	167	2,739		
Monterey			22,924	298,080	2	40
Napa			4,134	50,671	2	35
Nevada			95	1,279		
Orange			793	10,797	189	3,557
Placer			5,721	62,167	8	161
Plumas	704	5,250	766	10,313		
Riverside			11,817	159,434	41	580
Sacramento			10,704	103,728	2	43
San Benito	15	125	4,451	57,535		
San Bernardino			100	200	1,216	15,391
San Diego	6	50	7,268	82,012	17	282
San Francisco						
San Joaquin	1,843	17,476	24,786	310,587	2,968	32,786
San Luis Obispo			33,608	428,636	1	24
San Mateo			68	1,473		
Santa Barbara	3	30	2,300	27,892		
Santa Clara			376	10,198		
Santa Cruz			217	3,629		
Shasta			3,783	45,022		
Sierra	238	2,546	383	6,389		
Siskiyou	306	3,653	17,872	224,512		
Solano			20,924	391,753		
Sonoma			56	1,445		
Stanislaus	245	1,560	22,068	258,121	4,448	80,343
Sutter	40	250	14,537	176,750	352	7,750
Tehama			6,090	84,009		
Trinity	7	35	377	5,274		
Tulare	1	25	66,567	761,459	10 987	288,382
Tuolumne			277	5,373		
Ventura			2,896	67,366		
Yolo			13,452	237,393	21	710
Yuba			10,376	74,227		
Totals	7,027	70,683	478,217	6,203,206	41,308	938,049

TABLE XXIV.

Hay and Forage.

County	Hay and forage		County	Hay and forage	
	Acres	Tons		Acres	Tons
Alameda	80,735	113,534	Placer	16,034	13,404
Alpine	3,846	5,815	Plumas	30,152	34,038
Amador	14,449	17,961	Riverside	88,430	141,794
Butte	55,962	91,832	Sacramento	56,936	70,548
Calaveras	15,281	15,686	San Benito	64,064	84,380
Colusa	29,581	45,779	San Bernardino	42,608	76,359
Contra Costa	88,937	129,080	San Diego	82,049	86,559
Del Norte	3,052	10,131	San Francisco	103	150
El Dorado	12,115	11,685	San Joaquin	104,916	174,448
Fresno	95,265	214,659	San Luis Obispo	55,000	70,225
Glenn	25,143	37,594	San Mateo	19,060	28,982
Humboldt	30,018	119,613	Santa Barbara	50,070	70,146
Imperial	57,064	101,763	Santa Clara	83,553	127,006
Inyo	16,209	43,605	Santa Cruz	18,037	25,244
Kern	58,955	112,995	Shasta	35,341	46,578
Kings	57,749	158,306	Sierra	20,622	22,234
Lake	12,653	19,089	Siskiyou	57,976	100,113
Lassen	62,758	92,634	Solano	39,693	57,028
Los Angeles	154,048	316,541	Sonoma	62,351	87,949
Madera	17,606	29,978	Stanislaus	69,432	178,643
Marin	17,460	37,972	Sutter	32,744	57,017
Mariposa	6,521	6,049	Tehama	24,343	44,039
Mendocino	27,015	38,085	Trinity	5,350	8,929
Merced	68,917	173,335	Tulare	91,595	188,810
Modoc	75,479	118,906	Tuolumne	8,624	9,584
Mono	6,947	12,118	Ventura	51,546	78,926
Monterey	83,647	109,848	Yolo	45,859	104,733
Napa	26,061	39,331	Yuba	17,010	18,188
Nevada	8,725	9,497			
Orange	47,651	87,655	Totals	2,533,347	4,327,130

TABLE XXV.

Potatoes and Sweet Potatoes.

County	Potatoes, acreage		Sweet potatoes, acreage	
	1900	1910	1900	1910
Alameda	1,854	1,655	1	2
Alpine	14	22	----------	----------
Amador	108	125	----------	1
Butte	152	171	2	21
Calaveras	65	147	2	----------
Colusa	98	439	10	6
Contra Costa	1,583	12,687	9	----------
Del Norte	97	69	1	----------
El Dorado	71	113	----------	----------
Fresno	253	218	27	57
Glenn	36	24	4	1
Humboldt	1,173	1,108	1	----------
Imperial	----------	60	----------	9
Inyo	167	326	1	----------
Kern	672	339	22	31
Kings	46	194	9	19
Lake	141	182	7	----------
Lassen	286	259	----------	----------
Los Angeles	2,799	4,140	218	342
Madera	12	75	1	2
Marin	724	435	----------	----------
Mariposa	76	76	----------	----------
Mendocino	586	616	3	----------
Merced	364	246	780	2,114
Modoc	245	346	----------	----------
Mono	94	97	----------	----------
Monterey	2,374	5,393	1	----------
Napa	149	530	2	----------
Nevada	123	106	----------	1
Orange	1,318	1,770	75	484
Placer	28	72	1	----------
Plumas	114	100	----------	----------
Riverside	688	309	20	57
Sacramento	5,036	1,406	117	----------
San Benito	147	205	----------	----------
San Bernardino	406	444	25	55
San Diego	355	374	22	27
San Francisco	336	87	----------	2
San Joaquin	9,895	21,313	88	19
San Luis Obispo	406	955	6	3
San Mateo	500	971	5	----------
Santa Barbara	826	1,524	7	28
Santa Clara	988	1,085	----------	----------
Santa Cruz	1,007	1,080	1	1
Shasta	305	243	17	16
Sierra	55	46	----------	----------
Siskiyou	478	655	2	----------
Solano	114	311	----------	----------
Sonoma	3,260	2,279	2	----------
Stanislaus	30	207	31	1,647
Sutter	222	218	48	41
Tehama	150	112	6	30
Trinity	146	143	----------	----------
Tulare	253	677	15	46
Tuolumne	107	114	----------	2
Ventura	220	264	5	10
Yolo	206	402	12	31
Yuba	100	124	1	6
Totals	42,098	67,688	1,607	5,111

TABLE XXVI.

Dry Edible Beans and Peas.

County	Dry beans		Dry peas	
	Acres	Bushels	Acres	Bushels
Alameda	86	2,933	215	5,794
Alpine	----------	3	----------	----------
Amador	3	31	----------	----------
Butte	27	150	----------	----------
Calaveras	8	238	2	16
Colusa	1,083	20,087	14	180
Contra Costa	2,298	65,718	----------	----------
Del Norte	----------	10	4	60
El Dorado	1	30	----------	----------
Fresno	9	155	6	172
Glenn	----------	----------	----------	----------
Humboldt	18	392	517	9,056
Imperial	----------	----------	----------	----------
Inyo	70	1,055	1	10
Kern	26	648	----------	----------
Kings	21	576	15	75
Lake	----------	----------	----------	----------
Lassen	----------	----------	----------	----------
Los Angeles	3,874	105,011	14	311
Madera	15	333	----------	----------
Marin	1	8	----------	----------
Mariposa	62	409	----------	----------
Mendocino	5	44	17	345
Merced	523	5,839	----------	----------
Modoc	88	1,567	----------	4
Mono	5	133	11	63
Monterey	1,504	29,532	154	5,218
Napa	6	61	----------	----------
Nevada	1	18	----------	----------
Orange	21,186	402,951	55	605
Placer	----------	----------	----------	----------
Plumas	----------	----------	----------	----------
Riverside	50	192	----------	----------
Sacramento	7,801	166,852	90	1,703
San Benito	59	677	----------	----------
San Bernardino	----------	----------	----------	----------
San Diego	3,492	45,661	12	17
San Francisco	----------	----------	----------	----------
San Joaquin	13,954	352,157	362	10,050
San Luis Obispo	11,169	207,674	85	1,209
San Mateo	466	14,435	186	4,085
Santa Barbara	22,355	267,385	12	67
Santa Clara	706	8,810	----------	2
Santa Cruz	577	12,645	2	15
Shasta	49	685	3	15
Sierra	----------	----------	----------	----------
Siskiyou	10	272	1	10
Solano	2,553	65,755	----------	----------
Sonoma	7	83	----------	----------
Stanislaus	373	4,395	415	5,175
Sutter	2,766	76,201	----------	----------
Tehama	14	302	----------	----------
Trinity	4	275	----------	----------
Tulare	21	267	10	60
Tuolumne	3	61	----------	----------
Ventura	58,744	1,313,156	756	13,151
Yolo	1,835	51,204	----------	----------
Yuba	59	1,112	----------	----------
Totals	157,987	3,328,218	2,959	57,468

TABLE XXVII.

All Other Vegetables.

(Except Potatoes, Sweet Potatoes, Dry Peas, and Beans.)

County	Acres	County	Acres
Alameda	7,459	Placer	408
Alpine	14	Plumas	97
Amador	315	Riverside	1,225
Butte	513	Sacramento	6,367
Calaveras	278	San Benito	183
Colusa	160	San Bernardino	813
Contra Costa	3,650	San Diego	1,131
Del Norte	29	San Francisco	406
El Dorado	197	San Joaquin	6,728
Fresno	1,391	San Luis Obispo	950
Glenn	115	San Mateo	3,210
Humboldt	675	Santa Barbara	1,588
Imperial	3,672	Santa Clara	4,241
Inyo	240	Santa Cruz	648
Kern	589	Shasta	577
Kings	674	Sierra	35
Lake	353	Siskiyou	673
Lassen	184	Solano	650
Los Angeles	13,385	Sonoma	954
Madera	256	Stanislaus	1,621
Marin	117	Sutter	303
Mariposa	193	Tehama	292
Mendocino	594	Trinity	192
Merced	380	Tulare	2,550
Modoc	549	Tuolumne	232
Mono	36	Ventura	588
Monterey	658	Yolo	1,086
Napa	428	Yuba	235
Nevada	231		
Orange	3,785	Total	79,163

TABLE XXVIII.

Sugar Beets in 1900 and 1910, by Counties.

County	1900		1910	
	Acres	Tons	Acres	Tons
Alameda	3,680	44,974	2,516	29,201
Alpine				
Amador				
Butte			711	6,977
Calaveras			1	1
Colusa	566	5,320	211	1,824
Contra Costa	524	3,688	40	250
Del Norte				
El Dorado				
Fresno			228	1,196
Glenn			1,264	9,769
Humboldt				
Imperial				4
Inyo				
Kern				
Kings			504	1,304
Lake				
Lassen			2	10
Los Angeles	697	4,856	14,191	162,059
Madera				
Marin				
Mariposa				
Mendocino				
Merced			2	24
Modoc			9	137
Mono				
Monterey	10,333	112,367	9,900	126,397
Napa				
Nevada			39	78
Orange	1,143	7,853	10,275	133,612
Placer				
Plumas				
Riverside			4	33
Sacramento	101	502	7	105
San Benito	1,080	6,587	283	3,826
San Bernardino	1,132	4,077	4,121	42,928
San Diego			21	87
San Francisco				
San Joaquin	423	2,537	132	1,429
San Luis Obispo	285	1,384	284	5,993
San Mateo				
Santa Barbara	2,426	11,388	11,320	90,849
Santa Clara	4,214	12,373	1,135	8,180
Santa Cruz	2,759	41,553	312	3,511
Shasta				
Sierra				
Siskiyou			128	245
Solano	400	4,000	4	16
Sonoma	580	5,600		
Stanislaus				
Sutter			27	250
Tehama				
Trinity				
Tulare			1,239	9,447
Tuolumne				
Ventura	10,899	87,476	14,333	149,715
Yolo			5,714	55,734
Yuba				
Totals	41,242	356,535	78,957	845,191

PART IV.

HORTICULTURE.

ORCHARDS AND VINEYARDS.

Orchard Fruits, Tropical Fruits, Olives and Olive Oil, Citrus Fruits, Raisins and Currants, Almeria Grapes, Almonds and Walnuts. Number of Trees and Vines by Counties.

CALIFORNIA FRUIT AND NUT CROPS 1890-1915.

Some of the Leading California Fruits.*

In value of production among the orchard fruits, the peach ranks second. It has a wider range for possible growth than the apple. The nectarine is so similar to the peach as to be botanically classed as a variety of that fruit. It is even more difficult to grow than the apricot, and is produced almost entirely in California.

There are two distinct branches of the apple industry in California; one is the growing of early varieties, like the Astrachan and Gravenstein, which are grown mostly in the Sacramento Valley and foothills; the other, the production of winter apples. The greatest apple district of the State is the Pajaro Valley, including parts of Monterey and Santa Cruz counties, centering at Watsonville.

California has a monopoly of apricot growing, and in canned and dried forms this is one of the leading fruits exported.

The cherry is one of the lesser orchard fruits of California, but the peach is the greatest orchard fruit of the deciduous class produced in the State.

The production of pears declined for many years, owing to the ravages of the pear blight, but is now recovering from the setback the industry received. The varieties grown are comparatively few, and the Bartlett is the chief.

Prunes and plums are largely grown in certain counties, and the production of French prunes has developed into one of the largest fruit industries in the State.

The olive is another of the old Mission fruits which has come to the front again within the last few years. It thrives on a great variety of soils.

PROGRESS IN FRUIT GROWING IN 1915.

Year by year the area in fruit continues to expand in nearly all sections in the State.

Figs are annually becoming a more important crop, the White Adriatic being the most important variety. In the production of peaches California far exceeds all other states, especially in those dried and canned, but Georgia ships more fresh peaches, California being second.

The cultivation of dates is also progressing, but the acreage is so broken up into small holdings that it is difficult to estimate the number, but it now amounts to several hundred. They are mostly grown in the Coachella Valley, in Riverside County, where ten to fifteen thousand pounds were produced in 1915, but the production will be much larger during the present year owing to the increased acreage coming into bearing.

Olives continue to be largely planted, the production being about equally divided between southern California, and the northern and central counties.

In citrus fruits for the season of 1914–1915, there was a large increase in the shipments of lemons, and a falling off in oranges compared with the previous season. In southern California the number of cars of lemons was 6,843, compared with 2,924 for the season of 1913–1914, while the number of cars of oranges fell from 39,024 to 33,317. In northern and central California the oranges show a small increase of from 6,282 cars to 6,427 cars, but the shipments of lemons advanced from 78 to 225 cars.

The production of raisins beat all previous high records amounting to the enormous total of 256,000,000 pounds, compared with 182,000,000 in 1914. The vineyards in raisin grapes now amount to about 170,000 acres. In other dried fruits the quantity of apricots amounted to 32,000,000 pounds, compared with 40,000,000 pounds in 1914; dried figs show an increase of from 10,000,000 pounds in 1914, to 14,000,000 pounds in 1915; dried peaches also show a decrease of from 70,000,000 pounds in 1914, to 56,400,000 pounds in 1915; dried prunes increased from 120,000,000 pounds in 1914, to 164,000,000 in 1915, and plums show an increase of from 1,500,000 pounds to 1,900,000 pounds.

The shipments of fresh deciduous fruits compared with those for 1914 show very little change in the total number of cars. The number of cars of fresh apricots was 392, compared with 382 in 1914; cherries, 205 cars, against 166 in 1914; grapes increased from 8,773 cars in 1914 to 9,563 in 1915; peaches show a decline of from 2,144 in 1914, to 1,689 in 1915; pears, 2,725 cars in 1914, and 2,646 in 1915; plums, 1,907 cars in 1914, and 2,225 in 1915. Miscellaneous fruits amounted to 49 cars in 1914, and 58 in 1915. The total number of cars amounted to 16,146 in 1914, and 16,778 cars in 1915, or a total increase of 632 cars.

Imports and Exports.

In the imports and exports of fruits for the calendar year ending December 31, 1915, the exports of domestic fruits, as in other farm products, show a record increase both in quantity and value far exceeding all previous years. The countries to which the exports were made are for the year 1915, but the proportion of each print taken by each county does not vary much from year to year.

Dried Apricots Exported.

Year	Pounds	Value
1913	21,325,523	$2,308,779
1914	16,541,222	1,598,405
1915	25,747,600	2,323,001

Of apricots 7,062,000 pounds went to the United Kingdom, 2,937,000 pounds to France, 2,043,000 pounds to the Netherlands, and 13,704,000 pounds to other countries.

Dried Apples Exported.

Year	Pounds	Value
1913	38,734,465	$2,719,203
1914	31,027,551	2,441,094
1915	33,905,608	2,671,601

Of dried apples the Netherlands took 4,238,000 pounds, and the balance of 29,666,000 pounds went to other countries.

Apples (green or ripe).

Year	Barrels	Value
1913	1,920,221	$7,417,400
1914	1,541,361	5,695,621
1915	2,176,918	7,686,094

Of these 1,492,000 barrels were exported to the United Kingdom, 365,000 barrels to Canada, 50,000 barrels to Argentina, and 268,000 barrels to other countries.

Lemons.

Year	Boxes	Value
1913	58,428	$353,083
1914	94,317	351,897
1915	160,297	416,539

The bulk of the lemons were exported to Canada, Australia and the Philippine Islands ranking next.

Oranges.

Year	Boxes	Value
1913	905,942	$2,674,834
1914	1,839,862	4,225,991
1915	1,588,718	3,586,831

Of oranges Canada took 3,332,000 boxes, the United Kingdom 112,957 boxes, and the balance of 141,000 went to other countries.

Dried Peaches.

Year	Pounds	Value
1913	5,152,147	$341,215
1914	7,387,161	458,983
1915	18,720,272	1,120,534

The United Kingdom. Canada and Denmark took most of the dried peaches.

Dried Prunes.

Year	Pounds	Value
1913	94,344,157	$5,551,208
1914	35,228,737	2,582,560
1915	50,775,637	3,592,451

Prunes are exported to many countries. In 1915 the United Kingdom took 15,677,000 pounds, Canada 10,941,000 pounds, France 1,885,000 pounds, other European countries 18,572,000 pounds, and all other countries 3,897,000 pounds.

Raisins.

Year	Pounds	Value
1913	16,594,394	$1,606,509
1914	21,688,429	1,485,417
1915	58,497,249	4,240,068

Raisins show a larger increase than any other fruit, while the imports have steadily and greatly fallen off. In exports Canada is much the largest customer, followed by New Zealand and England. The rest is taken by a number of foreign countries, all over the world, in various quantities under one million pounds.

Canned or Preserved Fruits.

Year	Value
1913	$5,256,617
1914	5,553,968
1915	6,605,350

Of these the United Kingdom took canned fruits of the value of $5,265,000, Canada $180,670, and other countries $1,159,000. The total value of all fruits exported, including green or ripe pears valued at $716,000, berries, $448,000, all other green, ripe or dried fruit not specified, $2,844,000, and all other preserved fruits of the value of $672,000 was as follows:

Year	Value
1913	$32,913,445
1914	28,868,839
1915	36,924,455

Nuts.

Year	Peanuts	All other	Total
1913	$391,508	$403,742	$795,250
1914	378,793	287,871	666,664
1915	330,042	492,087	822,129

The total value of all fruits and nuts exported during the above three years was, in 1913, $33,708,695; in 1914, $29,535,503; and in 1915, $37,746,584. The value of imports of fruits and nuts for the same period was, in 1913, $48,804,545; in 1914, $49,772,047; and in 1915, $40,427,623, a considerable falling off from the two previous years.

Bananas.

Year	Bunches	Value
1913	46,057,509	$15,393,672
1914	46,640,243	15,863,972
1915	38,230,310	12,687,696

Imported principally from Central American States, British Honduras, and the British West Indies, and also from Cuba.

Currants

Year	Pounds	Value
1913	30,924,305	$1,195,330
1914	32,130,575	1,244,752
1915	25,240,218	1,246,491

Currants are imported almost exclusively from Greece.

Dates.

Year	Pounds	Value
1913	40,261,910	$775,920
1914	25,786,468	431,401
1915	26,453,118	431,591

Dates are mostly imported from Turkey in Asia.

Figs.

Year	Pounds	Value
1913	19,162,494	$948,460
1914	20,506,563	968,448
1915	8,327,870	390,327

The largest quantity of figs is imported from Turkey in Asia, and the rest mostly from Greece and Portugal.

Grapes.

Year	Cubic feet	Value
1913	1,332,170	$1,594,526
1914	1,330,087	1,545,526
1915	625,364	703,560

(100 cubic feet equals one ton of 2,240 pounds.)

These (mostly Almeria grapes) are imported almost entirely from Spain.

Lemons.

Year	Value
1913	$6,413,847
1914	5,227,845
1915	2,366,907

Lemons are imported almost entirely from Italy.

Olives.

Year	Gallons	Value
1913	3,517,899	$1,589,090
1914	5,743,130	2,528,390
1915	3,713,315	1,551,152

Most imported olives come from Spain, but a considerable quantity also come from Greece.

Olive Oil (edible).

Year	Gallons	Value
1913	5,179,209	$6,776,842
1914	6,780,936	8,421,499
1915	6,368,872	8,105,834

More than two-thirds of the olive oil imported comes from Italy; France and Spain supply smaller quantities.

Oranges.

Year	Value
1913	$253,284
1914	52,860
1915	78,586

The bulk of the oranges imported come from Jamaica; Italy and Mexico also supply a smaller quantity.

Pineapples.

Year	Value
1913	$1,325,974
1914	1,355,123
1915	1,175,883

Most of the pineapples come from Cuba.

Raisins.

Year	Pounds	Value
1913	3,564,298	$288,338
1914	3,873,784	267,329
1915	1,604,803	167,516

Raisins are imported almost exclusively from Spain, but sultanas, or seedless, are imported from Smyrna in Turkey in Asia.

Preserved Fruits.

Year	Value
1913	$901,064
1914	1,096,259
1915	891,087

Preserved fruits come principally from France, but Italy also sends a considerable amount.

All Other Fruits Imported.

Year	Value
1913	$1,420,887
1914	1,653,106
1915	1,355,982

Total Value of Fruits Imported.

Year	Value
1913	$32,100,392
1914	32,235,011
1915	23,046,778

Nuts.

Year	Pounds	Value
1913	37,497,743	$4,406,258
1914	30,247,551	3,513,722
1915	35,079,347	4,580,491

Under this heading are included almonds, cocoanuts (in shell and copra), cream and Brazil nuts, filberts, peanuts and walnuts. About two-thirds of the nuts come from France, but Italy also supplies a considerable quantity.

Total Value of Fruits and Nuts Imported.

Year	Value
1913	$48,804,548
1914	49,772,047
1915	40,427,623

Figs.

The fig industry of California is annually becoming a more important crop. In 1884 the "White Adriatic" was introduced into Fresno County. Mr. Markarian planted the border of his vineyard to this variety, and ten years later packed figs in his raisin packing house.

The annual production of California, which is the only state that produces figs in commercial quantities, is approximately as follows:

	State	Fresno County
White Adriatic	5,000 tons	3,800 tons
Smyrna figs	600 tons	400 tons
Black Mission	300 tons	100 tons

For fuller details regarding various fruits, see the report for 1913, pages 105-130.

In the production of peaches, California leads all other states, large quantities being dried and canned, and in the shipment of fresh peaches is only exceeded by Georgia. Magnificent nectarines are grown, but in comparatively small quantities.

Shipment of Peaches in 1914 by Ten Leading States.

The ten leading states in the shipment of peaches in 1914, each showing shipments of more than 1,000 carloads, were as follows:

State	Carloads	State	Carloads
Georgia	4,803	Colorado	2,075
California	2,983	West Virginia	1,978
Washington	2,501	New Jersey	1,556
Ohio	2,340	Utah	1,556
Michigan	2,266	Maryland	1,231

California.

The following summary gives the principal districts from which fresh peaches are shipped:

(May 25th to October 1st.)

District	Carloads	District	Carloads
Newcastle	571.0	Denair	8.0
Loomis	365.0	Pasadena	8.0
Sanger	310.0	Swall	8.0
Kingsburg	250.0	Hemet	7.0
Selma	200.0	Lincoln	7.0
Penryn	162.0	Oakdale	7.0
Cucamonga	148.0	Oakland	7.0
Parlier	143.0	Anderson	5.0
Armona	141.0	Guinda	4.0
Corning	123.0	Loma	4.0
Fresno	68.5	Seville	4.0
Winters	55.0	Yettem	4.0
Del Rey	43.0	Cornwall	3.0
Tulare	43.0	Los Angeles	3.0
Clovis	40.0	Visalia	3.0
Auburn	38.0	Antioch	2.0
Hanford	30.0	Bowles	2.0
Dinuba	28.0	Merced	2.0
Yam	28.0	Laton	2.0
Fowler	20.0	Monmouth	2.0
Reedley	13.0	Winton	2.0
Sultana	12.0	Corona	1.0
Yuba City	12.0	Miley	1.0
Cutler	11.0	Stockton	1.0
Riverbank	11.0	Woodsbro	1.0
Suisun	10.3		
Oleander	10.0	State total	2,983.8

Dates.

During the last year or two, dates have been grown in an experimental way, but the success of some of the tests has encouraged larger cultivation. While date trees can be grown wherever the orange is grown, they will not properly mature in any except the hottest and driest portions of the State. According to Dr. J. Eliot Coit, pomologist, California Experiment Stations, the requisite conditions may be found in many places throughout the Imperial, Coachella, and Colorado valleys, and the country around Palo Verde and Blythe, Riverside County. At other places in the State, such as the vicinity of Riverside, Redlands, Fresno, and Oroville, early dates might be grown in a small way for home consumption, or be sold in the fresh, uncured condition. While the new industry has a very promising future, it should be clearly borne in mind that date culture is a new industry, requiring experience and unusual skill on the part of the grower, and it must be carried out in regions having an extremely hot summer climate, and it must be remembered that to bring date palms into bearing costs very much more per acre than to grow any other orchard crop.

There are more than 500 named varieties of date palms, and 220 varieties have been tested out in this country by the Government Experimental Gardens and private parties.

Less than a dozen of the varieties now being tested seem to warrant planting in commercial quantities—the Deglet Noor, Itema, Tazizaoot, Hayana, Saidy, Ascherasi, Maktum, Horra, Thoory, and Agrass, being exceptionally desirable, while planting seed of the following, Deglet Noor, Menakher and Medjool is recommended.

The date has a real food value that is not understood by the uninitiated. The Arabs of the Sahara, as well as those of Arabia and Persia, use dates for more than one-third their food. The dry varieties are especially adapted for carrying on long journeys and are called by the Arabs "bread dates." We now import millions of pounds of inferior dates from Persia each year. With the supply of good dates increasing, in time the date will become one of the staple food products of America. Dates being 56 to 70 per cent sugar, preserve themselves and will keep indefinitely.

While of many varieties, dates may practically be classed as of three sorts—soft, dry, and semi-dry. The Deglet Noor is probably the best of the latter class. Dates are grown principally at Mecca, in the Coachella Valley, in Riverside County. The production of dates in 1913 was estimated at 7,500 pounds. In 1914 the average fruit production of the bearing palms was considerably in excess of any preceding year. Some Deglet Noor palms near Indio averaged 150 pounds per palm, compared with 100 pounds the previous year, and the fruit was of first quality. The acreage of dates is so broken up into a number of small holdings that it is difficult to estimate the area, but it now amounts to several hundred acres.

Reports from the Government Date Garden at Indio, indicate that the production of all kinds in 1915 was about ten to fifteen thousand pounds, which will probably be much greater in 1916 owing to the increased acreage coming into bearing.

A number of these dates were marketed in the fresh condition, while others were packed and shipped to friends in different parts of the East.

The important feature now in the development of this new industry will be to get offshoots of good varieties. France has issued a decree prohibiting exportation of Deglet Noor offshoots to any countries, with the exception of Tunis and Morocco. This variety can not be secured anywhere else and such offshoots as can be purchased in this country will be very high in price. There is a question whether offshoots of any varieties can be secured from Egypt in the next three to five years. There are very few varieties from the Persian Gulf region that are worthy of propagation in this country, as very few varieties from Persia have been found that are resistant to the climatic conditions in the two valleys in the ripening season.

Thousands of seedlings are now beginning to produce fruit, and many of them are producing fruit of good quality and a larger production is hoped for each year, as the seed is pedigreed pollination from selected males and results have been gained already that look very promising for the origination of new varieties here that will help to build up the industry and bring it to a commercial basis much sooner than could otherwise be accomplished.

There is no question as to the market for all dates grown in California and Arizona, as past experience has shown that when they are placed on the market in a clean, sanitary condition, they are readily sold for prices that range from sixteen to forty cents per box, wholesale.

The value of the dates imported in 1915 was $420,203, and of bananas, which is one of the few fruits not grown in California, the value amounted to $13,512.960.

The Coachella Valley, it is claimed, will produce finer dates than the Imperial or Colorado valleys, owing to the humidity being less than in the other regions. Fruit of good quality for home use can undoubtedly be produced in a large part of the San Joaquin Valley, some parts of the Sacramento Valley, and a warm coastal region, such as that around San Diego. It is a question of introducing varieties that are at home in such climates, and to this work the Bureau of Plant Industry is devoting a great deal of energy. In 1913, 18,145,341 pounds of dates were imported, valued at $363,734, the duty being one cent per pound.

Orchard Fruits, Grapes, Tropical Fruits, Small Fruits, and Nuts—1909-1910.

The acreage in fruits has never been ascertained. In comparing one year with another the number of trees or vines of bearing age is on the whole a better index of the general changes or tendencies than the quantity of product, which may vary largely, owing to favorable or unfavorable climatic conditions.

The total quantity of orchard fruits produced in 1909 was 31,502,000 bushels, valued at $18,359,000. Plums and prunes, peaches and nectarines, apples and apricots are the most important of the orchard fruits.

The production of grapes in 1909 amounted to 1,979,687,000 pounds, valued at $10,847,000, and the production of nuts was 28,378,000 pounds, valued at $2,960,000. Most of the nuts were Persian or English walnuts and almonds.

The total value of the tropical fruits produced in 1909 was $16,752,000, the value of oranges representing more than three-fourths of the total, and the value of lemons being next in importance.

Avocados.

The total output of avocados during the past year is not known definitely, but is very small. There are only a few trees of the better varieties in full bearing. The better known trees in this vicinity bore from 500 to as high as 3,000 fruit each, last spring. This fruit sold for prices ranging from 50 cents to $1.00 for each fruit, so that the profits from these trees range from $400 to approximately $2,000 each. Avocados recently in this market brought $15 a dozen. The production of avocados of good varieties will not commence to increase rapidly until about three years from now, when some of the young orchards planted will commence to produce. According to records, prior to this spring there were 6,790 budded trees planted in orchard form. Of this amount, probably not more than 2,000 are of first-class marketable varieties, by which is meant, marketable in competition with good varieties. The records also show 35,692 trees in nursery stock. Probably 20,000 trees out of this stock will be planted in orchard form this year. Plantings this spring will be mostly of good varieties, and a real production of avocados will commence in four years, when these trees should begin to produce.

Under present conditions, large plantings of nursery stock are not possible because of the fact that Mexican seed can not be imported, and the local seed furnished at this time will not run over about 40,000 seed per year, a great deal of which is wasted. This is, to a certain extent, a guarantee against overproduction of either nursery stock or orchards, as is also the fact that land best adapted to the growing of avocados must be of the same quality as land adapted to profitable growing of lemons, and most of this land, where water is available, is now already planted in citrus stock, so that the present available land best adapted for avocados is not large in acreage.

There seems every reason to believe that the market for avocados of good quality will develop fully as fast as the product unless it be for a limited period where overproduction may be necessary in order to bring the price for the fruit down to a point where the ordinary housekeeper can afford to purchase it. When the avocado sells for 10 or 15 cents for fruit of from three-fourths to a pound in a weight, the general opinion is that the market will develop very rapidly. At these prices, an avocado grove should bring considerably higher profit per acre than citrus fruit.*

Small Fruits—1899-1909.

Strawberries are by far the most important of the small fruits raised in California, with raspberries and loganberries, and blackberries and dewberries ranking second and third, respectively.

The acreage of small fruits in 1909 was 9,687 and in 1899 it was 6,281, an increase of 54.2 per cent. The production in 1909 was 26,824,000 quarts, as compared with 14,582,000 quarts in 1899, and the value was $1,789,000 in 1909, as compared with $911,000 in 1899.

Athough fruits are grown with few exceptions in every county in the State, certain counties take the lead in producing the principal fruits. The following is a brief summary of some of them:

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*California Avocado Association, Los Angeles.

PRINCIPAL ORCHARD FRUITS BY COUNTIES.

Best Location for the Leading Fruit Crops.

The following summary is both interesting and valuable, as the figures show which districts are the best for raising the different varieties of fruit. In the earlier years many failures were experienced by growers, owing to the soil or climate not being suitable for the trees they had planted.

According to the number of trees in bearing, the following six counties rank in the order named in the production of various fruits:

Apples.

County	Number of bearing trees	County	Number of bearing trees
Santa Cruz	647,136	Santa Clara	102,841
Sonoma	386,740	Los Angeles	101,433
Monterey	290,404	Humboldt	73,010

Apricots.

Santa Clara	783,585	Ventura	219,836
Solano	310,262	Fresno	186,823
Alameda	270,461	Yolo	117,228

Cherries.

Santa Clara	173,002	Sonoma	43,927
Alameda	89,284	Placer	31,209
Solano	53,923	San Joaquin	21,590

Peaches and Nectarines.

Fresno	2,277,314	Placer	683,824
Kings	777,697	Santa Clara	437,677
Tulare	714,494	Solano	341,266

Pears.*

Solano	182,194	Santa Clara	142,550
Sacramento	161,094	Sonoma	109,965
Placer	142,999	Alameda	70,382

*Owing to the ravages of the pear blight, the number of bearing trees decreased from 2,512,890 in 1900 to 1,410,905 in 1910.

Prunes and Plums.

Santa Clara	3,387,455	Placer	279,766
Sonoma	569,232	Tulare	264,337
Napa	299,613	Sacramento	206,553

Total Number of Bearing Orchard Trees.

The following twelve counties have the largest number of orchard fruit trees in bearing, in the order named:

County	Number of bearing trees	County	Number of bearing trees
Santa Clara	5,043,766	Kings	1,048,506
Fresno	2,579,859	Santa Cruz	875,642
Sonoma	1,364,105	Alameda	627,824
Solano	1,357,911	Sacramento	506,961
Placer	1,190,074	Napa	497,391
Tulare	1,059,830	Butte	452,302

TROPICAL FRUITS.

Figs.

County	Number of bearing trees	County	Number of bearing trees
Fresno	120,124	Yolo	10,476
Stanislaus	37,676	Merced	9,837
Tulare	15,750	Butte	9,518

Olives.

San Diego	109,871	Butte	73,453
Los Angeles	84,934	Fresno	72,788
Riverside	80,572	Orange	67,046

Lemons.

Los Angeles	219,149	Riverside	115,020
San Diego	195,318	Ventura	95,018
San Bernardino	157,731	Orange	46,954

Oranges.

San Bernardino	1,951,254	Tulare	801,151
Los Angeles	1,674,695	Orange	478,272
Riverside	1,021,957	Butte	147,412

Pomeloes.

San Bernardino	13,134	San Diego	5,764
Tulare	8,114	Riverside	4,477
Los Angeles	6,853	Yolo	1,325

Total Number of Bearing Trees of Tropical Fruit.

San Bernardino	2,153,501	Ventura	253,754
Riverside	1,224,217	Butte	235,442
Los Angeles	1,194,402	Santa Barbara	99,023
Tulare	872,657	Sacramento	84,863
San Diego	425,260	Kern	82,888
Fresno	291,754	Placer	59,906

GRAPEVINES.

County	Number of bearing vines	County	Number of bearing vines
Fresno	*†40,687,207	Santa Barbara	†5,987,127
Sonoma	†17,939,972	Santa Clara	†5,584,480
San Joaquin	†13,371,794	Los Angeles	*†4,923,877
Napa	†8,595,338	Kings	*†4,538,732
Sacramento	†7,627,510	Contra Costa	†2,972,130
Tulare	*†7,227,491	Yolo	*†2,568,019

*Raisin grapes. †Wine grapes. All produce table grapes.

NUTS.

Almonds.

County	Number of bearing trees	County	Number of bearing trees
Contra Costa	209,056	Butte	84,069
Yolo	149,019	Los Angeles	76,949
Solano	98,276	Sacramento	66,372
San Joaquin	97,024	Sutter	61,572

Walnuts.

Los Angeles	281,837	Santa Barbara	96,776
Orange	276,842	Santa Clara	19,070
Ventura	98,622	Sonoma	11,955

Pecans.

San Diego	1,080	Los Angeles	313
Napa	996	Ventura	301
Kern	563	Santa Clara	136

Total Nut Trees in Bearing.

Los Angeles	359,349	Solano	100,239
Orange	278,879	San Joaquin	99,499
Contra Costa	215,249	Santa Barbara	97,091
Yolo	150,822	Sacramento	67,156
Ventura	110,984	Sutter	62,289

SMALL FRUITS.

Strawberries.

County	Number of acres	County	Number of acres
Los Angeles	1,380	Placer	433
Santa Cruz	489	Monterey	263
Santa Clara	460	Fresno	148
Sacramento	450	Sonoma	103

Blackberries.

Sonoma	930	Fresno	91
Los Angeles	280	Tulare	70
Santa Clara	228	San Bernardino	68
Santa Cruz	116	Placer	62

Total Small Fruits.

County	Number of bearing trees	County	Number of bearing trees
Los Angeles	1,975	Monterey	407
Sonoma	1,471	Alameda	401
Santa Clara	1,011	Fresno	310
Santa Cruz	744	Orange	205
Placer	582	Stanislaus	161
Sacramento	554	Butte	148

Acreage and Production of Small Fruits, 1899-1909.

Kind	Number of farms, 1909	Acres		Quarts, 1909	Value, 1909
		1899	1909		
Strawberries	2,282	2,418	4,585	15,694,326	$1,149,475
Blackberries and dewberries	3,190	1,960	2,576	4,898,524	282,383
Raspberries and loganberries	2,524	987	1,992	5,222,117	304,169
Currants	364	724	407	852,378	43,508
Gooseberries	343	133	74	145,119	9,086
Cranberries	12	--------	53	10,656	443
Other berries	1	59	*	1,000	150
Totals	--------	6,281	9,687	26,824,120	$1,789,214

*Less than 1 acre.

Of the small fruits strawberries lead, both in acreage and production, California being the largest producer in the West, the greatest production being in Santa Clara County. The shipments of strawberries in 1914 was estimated at 2,312 carloads from the following districts:

Strawberries.

	Carloads		Carloads
Los Angeles section (Mar. 1 to Dec. 1)—		Santa Clara-Santa Cruz section (Apr. 1 to Dec. 1)—	
Puente	177.0	Gilroy, Sargent, Vega	1,010.0
Gardena	119.0	Watsonville	242.0
Moneta	46.0	Alviso	173.0
Irwindale	17.0	Mountain View	19.0
Azusa	14.0	Pajaro	17.0
Glendora	.5	Aromas	14.0
		Niles	13.0
Total	373.5	Palo Alto	12.0
Sacramento section (Mar. 25 to Aug. 15)—		Salinas	7.0
		Agnew	6.0
Florin	249.0	San Carlos	6.0
Elk Grove	6.0	Capitola	4.0
		Lawrence	4.0
Total	255.0	Irvington	3.0
Placer County section (April 1 to June 1)—		Menlo Park	2.0
Newcastle	43.0	Total	1,532.0
Bowman	12.0		
Loomis	10.0	Siskiyou section (May 20 to July 15)—	
Sebastopol	9.0		
Penryn	2.0	Pioneer	31.0
		Sisson	2.5
Total	76.0		
Fresno section (April 1 to Aug. 15)—		Total	33.5
Fresno	42.0	State total	2,312.0

The above are the leading producing districts, but it must be kept in mind that these data cover only the 1914 shipments, and that seasonal variation is so great that in some cases these figures may be far in excess or much below the usual shipments. The acreage in strawberries in 1915 was estimated at 6,046, and the total in the United States, 93,155 acres.

The cultivation of named varieties of blackberries was begun about 1850, and since that time at least 140 different named varieties have been introduced. In 1910 the acreage in California was 2,576. The largest state acreage was in Missouri and New Jersey, with 5,975 and 4,332 acres, respectively; the total acreage in the United States amounting to 49,004 acres.

Currants are only grown in about eight states, California being one of them, Alameda County being the largest producer; gooseberries are not much grown anywhere in the United States, Indiana being the largest producer.

Cranberries only acquired commercial importance fifty or sixty years ago. They are principally grown in Massachusetts, New Jersey, and Wisconsin, and are not a success in California.

Number of Trees and Vines in 1910.

Crop	Bearing trees in 1910	Non-bearing trees in 1910	Total	Quantity, bushels, 1909	Value, 1909
Orchard fruits—					
Peaches and nectarines	7,829,011	4,409,562	12,238,573	9,267,118	$4,573,775
Plums and prunes	7,168,705	1,599,939	8,768,644	9,317,979	5,473,539
Apricots	2,992,453	581,524	3,573,977	4,066,823	2,768,921
Apples	2,482,762	1,054,107	3,536,869	6,335,073	2,901,662
Pears	1,410,905	398,093	1,808,998	1,928,097	1,660,963
Cherries	522,304	300,063	822,367	501,013	951,624
Quinces	76,979	65,471	142,450	32,638	26,266
Mulberries	2,076	1,303	3,330	52,766	2,147
Totals	22,485,195	8,410,062	30,895,257	31,501,507	$18,358,897
Tropical fruits—					
Oranges	6,615,805	2,093,410	8,709,215	[1]14,436,180	$12,951,505
Lemons	941,293	379,676	1,320,969	[1]2,756,221	2,976,571
Pomeloes (grapefruit)	43,424	25,589	69,013	[1]122,515	143,180
Mandarins	351	23	374	[1]555	607
Tangerines	3,637	34	3,671	[1]3,581	4,188
Total citrus fruits	7,604,510	2,498,732	10,103,242	[1]15,319,052	$16,076,051
Olives	836,347	121,659	958,006	[2]16,132,412	$401,277
Figs	269,001	214,527	483,528	[2]22,990,353	260,153
Guavas	7,031	443	7,474	[2]95,053	4,018
Loquats	3,711	1,011	4,722	[1]4,516	5,830
Pomegranates	1,771	2,745	4,516	[2]30,075	968
Japanese persimmons	3,274	8,801	12,075	[3]2,696	3,344
Dates	325	19,552	19,877	[2]3,332	418
Unclassified	35	200	----------	----------	----------
Totals	[4]8,726,005	[4]2,867,670	11,593,675	----------	[4]$16,752,101

[1] Boxes. [2] Pounds. [3] Bushels. [4] Includes limes, bananas, and citrons.

Grapes.

	Bearing	Non-bearing	Total	Quantity, pounds	Value
Grapes	144,097,670	39,526,319	183,623,989	1,979,686,525	$10,846,812

Nuts.

	Bearing trees in 1910	Non-bearing trees in 1910	Total	Quantity, pounds, 1909	Value 1909
Almonds	1,166,730	365,961	1,532,691	6,692,513	$700,304
Persian or English walnuts	853,237	546,804	1,400,041	21,432,266	2,247,193
Black walnuts	6,582	7,905	14,487	159,374	2,562
Pecans	4,226	2,793	7,019	44,955	4,632
Chestnuts	1,763	2,948	4,711	37,153	3,474
Franquette	408	617	1,025	4,550	910
Unclassified	1,356				
Totals	*2,034,302	*931,933	2,966,235	*28,378,115	$2,959,845

*Including Oou-shue, Chili nuts, Brazil nuts, Japanese chestnuts, beechnuts, hazelnuts, French nuts, Japanese walnuts, pistachios, butternuts, mazettes, hickory nuts, filberts, and other nuts.

Summary.

	Bearing trees	Non-bearing trees	Total
Orchard fruits	22,485,195	8,410,062	30,895,257
Tropical fruits—citrus	7,604,510	2,498,732	10,103,242
Other tropical fruits	1,121,495	368,938	1,490,433
Total tropical fruits	8,726,005	2,867,670	11,593,675
Nuts	2,034,302	931,933	2,966,235
Total trees	33,245,502	12,209,665	45,455,167
Grapevines	144,097,670	39,526,319	183,623,989

The following table shows the quantities of the more advanced products manufactured by farmers from orchard and tropical fruits and grapes in 1909:

Product	Number of farms	Unit	Quantity, 1899	Produced 1909
Cider	481	gallons	75,443	118,456
Vinegar	973	gallons	199,678	244,683
Wine and grape juice	2,163	gallons	5,492,216	16,005,519
Olive oil	78	gallons	8,445	95,955
Raisins and dried grapes	4,551	pounds	117,935,727	169,210,679
Other dried fruit	8,373	pounds		189,495,705

NOTE.—These figures do not include wine, grape juice, and vinegar made in regular wineries, nor olive oil made in regular factories.

Leading Counties in Fruits and Nuts.

(Value of one million and upward in 1909.)

County	Value	County	Value
Los Angeles	$6,731,000	Sonoma	$2,034,000
San Bernardino	5,357,000	Ventura	1,795,000
Fresno	5,279,000	Santa Cruz	1,656,000
Santa Clara	4,234,000	Solano	1,495,000
Riverside	2,393,000	Placer	1,318,000
Orange	2,497,000	San Joaquin	1,307,000
Sacramento	2,265,000	Kings	1,219,000
Tulare	2,053,000		

Total Value of All Crops, by Counties.

(Value of four million dollars and upward in 1909.)

(Compiled from the Reports of the Bureau of the Census.)

County	Value	County	Value
Los Angeles	$14,720,000	Tulare	$5,353,000
San Joaquin	9,082,000	Riverside	5,133,000
Fresno	7,991,000	Sacramento	4,720,000
Santa Clara	6,968,000	Sonoma	4,451,000
San Bernardino	6,818,000	Monterey	4,325,000
Ventura	6,751,000	Alameda	4,276,000
Orange	6,176,000	Contra Costa	4,032,000

NOTE.—These figures are for the value of crops only, and do not include wine and other products.

The three leading crops on the basis of value in California in 1909 according to the census reports were:

Crop	Acreage	Production	Value
Fruits and nuts			$50,706,869
Hay and forage	2,533,347	4,327,130 tons	42,187,215
Barley	1,195,158	26,441,954 bushels	17,184,508

The following summary shows that California holds a leading position in the production of a number of the principal crops of fruits and nuts in the United States, and also among others, of barley, beans, and sugar beets. The three leading states are here given from the census reports on the basis of value. When less than three states are named, others do not produce that particular crop.

Crop	Acreage	Production	Value
Almonds—			
California		6,692,513 pounds	$700,304
Avocados (Alligator pears)—			
Florida		4,920 crates	10,100
Apricots—			
California		4,066,823 bushels	2,768,921
Barley—			
Minnesota	1,573,761	34,927,773 bushels	17,213,817
California	1,195,158	26,441,954 bushels	17,184,568
Wisconsin	816,449	22,156,041 bushels	12,682,136
Beans (dry edible)—			
Michigan	403,669	5,282,511 bushels	9,716,315
California	157,987	3,328,218 bushels	6,295,457
New York	115,698	1,681,506 bushels	3,689,064
Beets (sugar)—			
Colorado	108,082	1,231,712 tons	6,061,152
California	78,957	845,191 tons	4,320,532
Michigan	78,779	707,639 tons	4,014,123
Blackberries and dewberries—			
Missouri	5,975	6,391,209 quarts	456,283
New Jersey	4,332	5,456,789 quarts	313,480
California	2,576	4,898,524 quarts	282,383
Cherries—			
California		501,013 bushels	951,624
Pennsylvania		475,093 bushels	909,975
Ohio		338,644 bushels	657,406
Currants—			
New York	2,557	3,982,389 quarts	264,051
Michigan	609	768,259 quarts	58,288
California	407	852,378 quarts	43,508
Dates—			
California		3,332 pounds	418
Arizona		6,500 pounds	96
Figs—			
California		22,990,353 pounds	260,153
Mississippi		1,949,301 pounds	107,609
Texas		2,411,876 pounds	97,078
Grapefruit (pomeloes)—			
Florida		1,061,537 boxes	1,907,816
California		122,515 boxes	143,180
Grapes—			
California		1,979,686,525 pounds	10,846,812
New York		253,006,361 pounds	3,961,677
Guavas—			
Florida		258,709 pounds	7,604
California		95,053 pounds	4,018
Hemp—			
Kentucky	6,855	6,420,232 pounds	348,386
California	300	600,000 pounds	39,000
Indiana	335	395,467 pounds	21,755
Hops—			
Oregon	21,770	16,582,562 pounds	2,838,860
New York	12,023	8,677,138 pounds	2,597,981
California	8,391	11,994,953 pounds	1,731,110
Lemons—			
California		2,756,221 boxes	2,976,571
Limes—			
Florida		11,302 boxes	12,457

Crop	Acreage	Production	Value
Loquats—			
California		1,516 boxes	5,830
Mandarins—			
Louisiana		3,340 boxes	5,945
California		555 boxes	607
Mangoes—			
Florida		5,278 boxes	5,739
Mustard seed—			
California	1,964	3,168,270 pounds	100,731
Nursery products—			
New York	6,680		2,750,957
California	4,803		2,212,788
Texas	3,847		1,253,110
Nuts (all)—			
California		28,378,115 pounds	2,959,845
Texas		5,945,932 pounds	562,542
Pennsylvania		3,795,804 pounds	90,447
Olives—			
California		16,132,412 pounds	401,277
Oranges—			
California		14,436,180 boxes	12,951,505
Florida		4,852,967 boxes	4,304,987
Peaches and nectarines—			
California		9,267,118 bushels	4,573,775
Georgia		2,555,499 bushels	2,182,613
Arkansas		1,901,647 bushels	1,502,996
Pears—			
California		1,928,097 bushels	1,660,963
New York		1,343,089 bushels	1,418,218
Michigan		666,023 bushels	535,771
Persimmons (Japanese)—			
California		2,696 bushels	3,344
Texas		1,175 bushels	2,136
Florida		1,615 bushels	2,066
Pineapples—			
Florida		778,644 crates	734,069
Plums and prunes—			
California		9,317,979 bushels	5,473,539
Oregon		1,747,587 bushels	838,783
Washington		1,032,077 bushels	600,503
Pomegranates—			
California		30,075 pounds	968
Georgia		27,365 pounds	920
Nevada		45,550 pounds	915
Seed (flower and vegetable)—			
California			594,724
Illinois			194,626
New York			72,991
Strawberries—			
New York	6,382	15,945,863 quarts	1,187,410
California	4,585	15,694,326 quarts	1,149,475
Missouri	9,048	15,171,034 quarts	1,122,784
Sunflower seed—			
Illinois	3,969	49,004 bushels	44,589
California	257	6,855 bushels	6,264
Indiana	430	6,330 bushels	5,894
Tangerines—			
Florida		34,871 boxes	64,082
California		3,581 boxes	4,188
Walnuts (Persian or English)—			
California		21,432,266 pounds	2,247,193

In Kafir corn and milo maize, California ranks fourth, Texas, Kansas, and Oklahoma taking the lead. In quinces California also takes the fourth place, New York, Pennsylvania, and Ohio leading. In raspberries and loganberries, New York, Michigan, and Ohio take the first three places, with California fourth and Washington fifth. In other crops, the first place is held by the following states: Apples, New York; broomcorn, Oklahoma; buckwheat, New York; chicory, Michigan; corn, Illinois; cotton and cottonseed, Texas; cranberries, Massachusetts; emmer and spelt, South Dakota; flaxseed, North Dakota; flowers and plants, New York; gooseberries, Illinois; hay and forage, New York; maple syrup, Ohio; maple sugar, Vermont; mint, Michigan; oats, Illinois; peanuts, North Carolina; peas (dry), Wisconsin; pecans, Texas; potatoes, New York; rice, Louisiana; rye, Michigan; seed (grass), Iowa; sorghum cane, Kentucky; sugar cane, Louisiana; sweet potatoes and yams, Georgia; tobacco, Kentucky; vegetables (other than potatoes, sweet potatoes and yams), New York; wheat, North Dakota.

FRESH DECIDUOUS FRUITS.

Statement Showing Number of Cars of Each Variety Shipped, 1903-1915.

Year	Apricots	Cherries	Grapes	Peaches	Pears	Plums	Apples	Miscellaneous	Totals
1903	241	211	1,804	1,857	1,720	1,145	671	22	7,671
1904	97	209	1,451	559	2,186	1,053	43	28	5,626
1905	279	79	1,602	1,946	1,013	1,391	1,913	16	8,239
1906	16	150	2,052	584	1,513	1,220	748	22	6,305
1907	71	133	3,460	699	1,039	1,039	1,067	18	7,526
1908	232	208	3,819	1,980	2,702	1,763	2,201	15	12,920
1909	210	250	5,880	2,599	2,638	1,526	2,158	19	15,280
1910	290	250	4,948	2,518	2,361	1,552	2,136	17	14,072
1911	215	216	6,374	2,027	2,325	1,366	--------	16	12,539
1912	196	244	6,357	1,621	3,135	1,776	--------	15	13,344
1913	158	231	6,363	2,359	2,496	1,706	--------	19	13,332
1914	382	166	8,773	2,144	2,725	1,907	--------	49	16,146
1915	392	205	9,563	1,689	2,646	2,225	--------	58	16,778

In no case do the above figures cover the entire shipment of apples, as they continue to be shipped long after the deciduous fruit season is closed.

OLIVES AND OLIVE OIL.*

There were very few new orchards planted in olive trees during the years 1905–1909, consequently the production of olive oil during the last few years has changed but slightly. The few orchards that are coming into bearing are mostly varieties that are used for pickling purposes, and the production of pickling olives is increasing considerably from year to year. Since 1909 a large area has been planted. The production of olives during the last few years has increased by improved methods of irrigation and fertilization, and the industry is growing in importance, and new planting is on a considerable scale. The production is about equally divided between southern California and the territory north of the Tehachapi. The harvests in California generally alternate between heavy and light, although the last few years the crops have been more uniform, due to the increased care and attention to orchards.

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*For further information regarding olives and olive oil, see the Report for 1913, pages 114-115.

Not more than 35 gallons of oil are produced from a ton of olives, although some manufacturers, who have heavy presses, claim to obtain 40 gallons of oil to the ton. It takes about 5½ pounds of olives to make one gallon of pickles. The output of pickled olives is increasing much more rapidly than the production of olive oil, as California manufacturers can not compete with foreign oil as to price.

The leading varieties now being planted in California are the Mission and Manzanillo, all other olives generally being treated as oil olives, as they are unfit for pickles.

It is estimated that at the present time there is a total of 18,000 acres in olives, producing in 1911 about 8,000 tons of oil olives, and 4,000 tons for pickling. Four years ago the average net income was only $17 an acre, in 1912 the average had increased to $36.88 an acre. In 1908 the olive industry represented capital invested amounting to $4,500,000, increased in 1912 to $7,500,000. Formerly the by-products were more or less wasted; now oil, described as "mechanical oil," is extracted from the pomace and used to a large extent by soap and other factories. The average yield per acre in California is about 1¼ tons, and the average price received by the growers for the three years, 1909–1912, for oil olives on the trees was $22 per ton. Forty per cent of the olives produced are pickling olives, and 60 per cent oil olives. The average price received by growers 1909 to 1912 for pickling olives on trees was $62 per ton. The net average receipts by growers for pickling olives was $53.50 per ton, and the net average receipts for both oil and pickling olives $36.88 per acre. The amount paid to growers in 1911, for approximately 12,000 tons, was $442,000; of this tonnage 4,000 were pickles, representing 1,200,000 gallons, and 8,000 tons of oil olives representing 280,000 gallons of oil.

The price for oil olives during the last two years increased greatly, and in the southern part of the State has ranged from $45 to $50, and sometimes a few dollars higher per ton, while in pickling olives the price has ranged from $75 to $175 per ton, the higher prices being for the very best quality and the largest size. The price for oil olives on the trees the last year or two was from $25 to $35 per ton, pickling olives $50 to $60 on the trees and upward, depending on the quality of the fruit. Very fancy fruit commands prices of $80, $90 and $100 on the trees.

In 1913 it is estimated that there were about 750,000 gallons of ripe olives, equal to 125,000 cases of 24 quart cans each. The estimated quantity of ripe olives in 1914 was about the same as last year. The quantity imported was 5,316,364 gallons, compared with 3,946,076 gallons the previous year. The quantity of olive oil manufactured was about 150,000 gallons and for 1914 the output is estimated at about 200,000 to 220,000 gallons. The quantity of olive oil imported for manufacturing purposes was 763,924 gallons, against 619,356 the previous year, and 6,217,560 gallons of edible oil, compared with 5,221,001 in 1913.

The largest factory for producing olive oil and pickled olives is in Los Angeles County. The leading counties in the production of olives are: San Diego, Los Angeles, Riverside, and Orange in the south, and Butte and Fresno in central California.

THE CITRUS FRUIT INDUSTRY.

The citrus fruit industry has reached its present development in southern California, which is made up largely of San Bernardino, San Gabriel, and San Fernando valleys, and in the coast region in Orange and Los Angeles counties. There are smaller but less favorable regions in Santa Barbara and Ventura counties, close to the mountains, and in San Diego County oranges have also been cultivated from an early period, and as far as Butte County in the north, and Tulare, Fresno, and Kern counties in central California. Most of the oranges in California are now of the Washington variety, the remainder comprising the Valencia Late as the most important variety, with fewer of the St. Michael, Mediterranean Sweet, Thompsons, Ruby, Blood, Jaffa, Seedlings, and Tangerines.

In the last few years there has been somewhat of a change in the proportion of navels shipped. For the season of 1914–1915 navel oranges probably only averaged 60 per cent of the total shipments of oranges from California.

The orange crop of northern California matures from four to six weeks earlier than it does in the southern part of the State, notwithstanding the fact that it is from 200 to 500 miles farther north. This unusual condition is due to the topography of the Pacific coast. The two large San Joaquin and Sacramento valleys in central and northern California lie between two great mountain ranges extending north and south. The Coast Range mountains shut off the modifying influences of the sea, causing relatively higher night temperatures during the summer months than prevail in the southern part of the State. The acreage of citrus fruits in Fresno, Tulare, and Kern counties was increased in 1915 by the planting of 3,000 acres, bringing the total acreage up to about 12,000 acres.

In southern California, San Bernardino is the largest producer of oranges, with 1,951,254 bearing trees; Los Angeles has 1,674,695, Riverside 1,021,957, and Orange County 478,272. In northern and central California, Tulare leads with 801,151, Butte 147,412, Fresno 85,781, Kern 80,940, and Sacramento 46,256.

Pomeloes are also grown to a considerable extent, the two leading counties being San Bernardino with 13,134 bearing trees, and Tulare with 8,114.

California Fruit Growers' Exchange.

Some idea of the size and value of the crop, and of the immense benefit derived by growers by a well-organized association, is shown by the results obtained by the California Fruit Growers' Exchange, the largest and most successful of all the co-operative institutions formed by the fruit growers. The following tabular statement shows the total number of boxes shipped each year, the amount received, and the average f. o. b. California price per box:

Year	Boxes shipped	F. O. B. returns	Average per box
1904-05	5,188,511	$7,124,377 00	$1 37
1905-06	4,705,515	9,936,497 00	2 11
1906-07	6,149,708	12,268,752 00	2 00
1907-08	6,628,644	11,753,544 00	1 77
1908-09	8,710,828	13,958,990 00	1 60
1909-10	7,578,801	14,831,975 00	1 96
1910-11	10,842,790	20,708,355 21	1 91
1911-12	9,232,357	17,235,822 98	1 87
1912-13	4,940,068	13,640,091 32	2 74
1913-14	11,264,865	18,990,725 54	1 69
1914-15	11,893,076	19,523,397 72	1 64

The great damage that was inflicted on California orange growers by the heavy frost which occurred the last week in December, 1911, and the first week in January, 1912, is shown in a striking manner by the returns of the California Fruit Growers' Exchange, the shipments being only 4,940,068 carloads, compared with 9,232,357 the previous season. This large decrease was in some measure made up for by better prices, the average being $2.74 per box, against $1.87 for the previous year. The total receipts were only $13,640,000, compared with $17,235,000, or a loss of over $3,595,000.

Over $100,000,000 has been brought to California by the Exchange in the eight years, 1904–5 to 1911–12, inclusive, with a loss from failure to collect or in the transmission of funds of less than $6,000.

The orange industry in California represents an investment of about $150,000,000.

The average annual yield on about 20 acres of orange grove from 1906 to 1911 was 157.6 boxes per acre. The average cost of labor and material in growing the oranges in 274 selected orchards was $136.06 per acre, of which $52.82 was for labor.

A careful estimate recently made places the production of oranges in California at 129 to 191 boxes to the acre, but there is considerable difference in the crop in various orchards. A recent publication of the United States Department of Agriculture places the average for the last five years at 157.6 boxes to the acre, and the cost of oranges delivered in the markets of the United States exactly 18 cents a dozen.

Increase in the California Citrus Crop in Ten Years.

From the figures of the Bureau of the Census, it appears that the orange crop of California made a gain of 145.4 per cent during the decade between 1899 and 1909, increasing from 5,882,000 boxes in 1899 to 14,436,000 boxes in 1909. During the same period of time, the number of trees in bearing have increased from 5,649,000 to 6,616,000, or 17.1 per cent. In 1910 there were also 2,093,000 trees of non-bearing age. In 1909, the average product per tree was 2.2 boxes. With respect to quantity of fruit, San Bernardino County rose from third rank in 1899 to first in 1909. In 1899 Los Angeles County ranked first and Riverside County second.

The value of the oranges produced in 1909 was $12,952,000, an average of 90 cents per box.

The California citrus crop for the season 1913–1914 was a record one, amounting to 48,338 cars, compared with 18,331 the previous season, when the production was greatly reduced by a killing frost, being the lowest in twelve years. Of the above carloads 45,306 were oranges, and 3,032 lemons. Previous to the season of 1913–1914 the highest was in 1910–1911, when 46,399 cars were shipped. For the season of 1914–1915 there was a large increase in the shipments of lemons and a falling off in oranges. In southern California the number of cars of lemons was 6,843 compared with 2,924 for the season of 1913–1914, while the number of cars of oranges fell from 39,024 to 33,317 cars. In northern and central California the oranges show an increase of from 6,282 the previous season to 6,427 cars, but the shipments of lemons advanced from 78 to 225 cars. Estimates for the present season ending October 31, 1916, indicate that the shipments of oranges will be about 650 cars less, than the previous season, and lemons about 550 cars greater. The year 1915 was the most disastrous in the history of the lemon business, the California lemon crop having been marketed at a loss of approximately thirty cents per packed box to the grower. This result was due to several causes, the crop being the largest ever produced in California, and a heavy supply of stored fruit, much of which was in bad condition.

LEMONS.

Although lemons have been grown in California for half a century, it is only during the last twenty years that they have risen to considerable commercial importance. The lemon is less hardy than the orange and comprises from 10 to 15 per cent of the citrus crop.

The principal varieties of lemons grown in California are the Eureka; the Lisbon, imported from Portugal; Genoa, imported from Genoa; Villa Franca, imported from Europe; and the Bonnie Brae, grown mostly in San Diego County.

California Lemon Crop, 1899-1909.

The lemon crop increased from 874,000 boxes in 1899 to 2,716,000 boxes in 1909, a gain of 1,842,000 boxes, or 210.7 per cent, although for the same period the reported number of trees of bearing age decreased from 1,493,000 to 927,000, or 38 per cent. The number of trees of nonbearing age in 1910 was 377,000. The number of boxes per tree in 1909 was 2.9; in 1899, it was just under three-fifths of one box. The value in 1909 was $2,926,000, or $1.08 per box.

The California lemon industry has been developed by small landowners. There are a few groves which contain from 150 to 1,000 acres, but the average grove contains less than 10 acres. In San Diego County 100 growers own approximately 1,000 acres. In the San Dimas district 300 growers own 1,180 acres; in the Pomona district 75 growers own 344 acres; in the Santa Barbara district 70 growers own 407 acres. The newer planting of the last three years usually contain 5, 10 or 15 acres and seldom more than 20 acres. In a recent survey, including every important district, 11,185 acres were owned by 1,179 growers; 39 growers owned between 20 and 50 acres; 6 growers, 50 to 100 acres; 8 growers, 100 to 250 acres; 1 grower, 250 to 500 acres; and 2 growers owned more than 500 acres.

The average annual yield on about 4,500 acres of lemon orchards from 1906 to 1911 was 196.2 boxes per acre. The average value of land

and water adapted to lemon culture in California is $450 per acre, and the cost of bringing a grove into bearing at six years of age, varies from $800 to $1,500 per acre, a fair average being $1,000. In 1909 there were approximately 22,000 acres of lemons in California; in 1912 there were 31,478 acres.

Practically all imported lemons come from Sicily, where the production is very large, the exports being estimated in 1911 at 57,030,543 pounds, or the equivalent of about 23,763 California carloads.

Pomelo or Grapefruit.

The pomelo or grapefruit was formerly almost exclusively grown in Florida, but its cultivation has increased in recent years, and considerable quantities are produced in Riverside, Tulare, San Diego, and other citrus counties. The leading varieties are the Nectar, Imperial, Marsh, Seedless, and Triumph.

Citron of Commerce.

The citron of commerce was grown by the Missions in the early days, but now is cultivated only to a small extent in Riverside County. At one time there was a grove of 21 acres in Los Angeles County, but it was neglected and five years ago was replaced by oranges, avocado, and other trees.

THE FLORIDA CITRUS CROP.

Florida is at present the only competitor with California in the United States in the production of oranges, although in recent years citrus fruits are being produced on a small scale in Arizona, Louisiana, and Texas.

Florida Citrus Trees in Bearing, 1890, 1900, and 1910.

	1890	1900	1910
Orange	2,725,272	2,552,542	2,766,618
Lemon	85,052	22,691	11,740
Lime	17,089	41,741	45,369
Pomelo	3,135	117,336	656.213
Citron	2,480	----------	23,234

Florida first took the lead in the production of citrus fruits in this country, but the "great freeze" of December, 1894, and February, 1895, when the temperature at some places fell to 14 and 18 degrees, was a disaster from which they are only now fully recovering. From 6,000,000 boxes shipped before the frost, the number fell the following year to 75,000.

Florida Orange Crop, 1899-1909.

The production of oranges in Florida increased from 273,000 boxes in 1899 to 4,853,000 boxes in 1909, a sixteenfold gain. The number of trees of bearing age was 2,553,000 in 1900 and 2,766,618 in 1910, an increase of 7.8 per cent. The number of trees of non-bearing age in 1910 was 1,098,000. The value in 1909 was $4,305,000, or $1.11 per box.

Florida Lemon Crop, 1899-1909.

The lemon crop increased from 2,359 boxes in 1899 to 12,367 boxes in 1909, a gain of 10,008 boxes, a fourfold gain. The number of trees of bearing age reported decreased from 22,691 in 1900 to 11,740 in 1910, or almost one-half. The number of trees of non-bearing age in 1910 was 7,329. The value of the lemon crop in 1909 was $13,753.

Orange and Lemon Crops of California and Florida, 1909-1910.

(From the Bureau of the Census.)

Orange and lemon trees of bearing and non-bearing age in 1910, and number of boxes of oranges and lemons produced in 1909, together with the value thereof, 1910:

	California	Florida
Oranges—		
Number of trees of bearing age, 1910	6,615,929	2,766,618
Number of trees of non-bearing age, 1910	2,093,101	1,097,896
Number of boxes produced in 1909	14,436,424	4,852,967
Value, 1909	$12,952,291	$4,304,987
Lemons—		
Number of trees of bearing age, 1910	927,130	11,740
Number of trees of non-bearing age, 1910	376,859	7,329
Number of boxes produced in 1909	2,715,974	12,367
Value, 1909	$2,925,759	$13,753
Pomeloes or grapefruit—		
Number of trees of bearing age	43,427	656,213

Florida Citrus Fruit Crop, 1885-1915.

Season	Oranges, boxes	Lemons, boxes
1885–86	900,000	----------
1886–87	1,260,000	----------
1887–88	1,450,000	----------
1888–89	1,950,000	----------
1889–90	2,150,000	----------
1890–91	2,450,000	----------
1891–92	2,664,791	18,389
1892–93	3,357,507	29,756
1893–94	4,163,849	57,219
1894–95	2,808,474	*713
1895–96	147,000	*
1896–97	216,579	1,800
1897–98	357,960	1,006
1898–99	1,250,000	2,200
1899–1900	972,589	1,447
1900–01	1,350,700	1,900
1901–02	972,589	1,447
1902–03	1,465,306	5,185
1903–04	1,950,823	4,131
1904–05	2,363,058	14,433
1905–06	2,961,195	8,299
1909–10†	6,100,000	----------
1908–09†	5,250,000	----------
1907–08	3,793,126	6,718
1906–07	2,899,390	10,065
1910–11†	4,600,000	----------
1911–12	4,708,350	----------
1912–13	8,125,349	----------
1913–14	6,751,080	----------
1914–15	9,571,319	----------
1915–16	8,500,000	----------

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*The year of the "great freeze," when the temperature fell to 14 degrees at Jacksonville and 18 degrees at Tampa on December 29, 1894, followed by one equally severe in February, 1895, which killed most of the citrus trees in the state.

†The figures for the last four years include lemons, the quantity being so small that separate records are not kept. Limes, grapefruit, and tangerines are also included. In the season 1909-10, there were about 7,100 boxes of lemons, 12,600 boxes of limes, and 553,000 boxes of grapefruit. The total for the season 1911-12 includes 810,000 boxes of grapefruit, and 156,000 boxes of tangerines; also limes and lemons, the quantities of which are comparatively small.

The prices received by Florida growers 1912-1914 are of interest as compared with the prices received in California.

Averages Received by the Florida Citrus Exchange, f. o. b. Packing-House, Season 1912-1913.

Fruits	Boxes, 1912-13	Average per box, 1912-13	Boxes, 1913-14	Average per box, 1913-14
Oranges	928,755	$1 92	796,480	$1 65
Grapefruit	393,964	1 98	224,244	2 31
Tangerines	31,787	1 92	17,921	2 51
Mixed and miscellaneous	383,539	1 84	247,885	1 95
Grand totals	1,738,045	$1 91	1,286,531	$1 83

In 1915 the number of orange trees in bearing was estimated at four million, and nonbearing one million. Grapefruit trees in bearing two and one-half million. nonbearing two million. Lemons are no longer grown commercially, but the number of limes is rapidly increasing.

THE CALIFORNIA RAISIN INDUSTRY.*

One of the largest and most important branches of fruit growing is the cultivation of the raisin grape, the acreage in which is now by far the largest in the world.

Raisins were first produced on a considerable scale in the southern part of the State, but Orange and Riverside counties no longer produce raisins; Los Angeles County very few; Yolo County, which at one time produced Sultanas and Thompson's Seedless in considerable quantities, now finds it more profitable to ship a large portion of the crop as table grapes, while the vineyards in Riverside and San Bernardino counties are nearly all in wine grapes.

Counties Where Raisins Are Produced.

Of the fifty-eight counties in California, less than a dozen produce raisins in commercial quantities. At the present time the proportion of an average crop raised by each county is estimated to be approximately as follows:

County	Pounds
Fresno	140,000,000
Tulare	15,000,000
Kings	15,000,000
Madera	1,600,000
Yuba	1,400,000
San Bernardino	1,300,000
San Diego	560,000
Merced	100,000
Stanislaus	60,000

Sutter County produces a quantity of Thompson's Seedless and Yolo County, Sultanas.

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*For the early history of the raisin industry in California, see Reports for 1912, pages 134–139, and 1914, pages 123–126.

A normal raisin crop amounts to about 160,000,000 to 170,000,000 pounds. The 1914 crop was large, amounting to 182,000,000 pounds, and in 1915 to about 256,000,000 pounds, classified as follows:

Varieties	Crop, 1913	Crop, 1914	Estimated crop, 1915
Muscats	98,588,798	120,000,000	157,246,000
Thompson's Seedless	18,390,922	36,000,000	23,330,000
Sultanas	12,252,430	18,000,000	11,190,000
Malagas		8,000,000	1,342,000
Feherzagoes	529,707		504,000
Dried grapes			1,288,000
Other varieties	228,143		
Totals	130,000,000	182,000,000	194,900,000
Additional outside			61,100,000
			256,000,000

The average price received by growers in 1914 was somewhat better than the previous year, Muscats being about $77.50 per ton, Thompson's Seedless about $95 per ton and Sultanas about $85 per ton. The quality was exceptionally good, better than the average.

When raisins were first shipped East in any quantity it is impossible to say. In 1875, New York reported that up to November 1st, 6,000 22-pound boxes of California raisins had been received. About 1888, Fresno appears to have shipped a considerable quantity for the first time.

The California Associated Raisin Company of Fresno now controls almost the entire acreage in raisin grapes, the contracts signed amounting to 154,833 acres as follows:

Muscats	97,667 acres
Thompsons	35,725 acres
Sultanas	7,835 acres
Malagas	12,259 acres
Feherzagoes	1,281 acres
Black grapes	66 acres

The Malagas do not represent a great deal in raisin tonnage, as a large proportion of them are shipped green as table grapes.

Raisin Grape Varieties.

The varieties of raisin grapes are few in number, the White Muscat of Alexandria and the Muscatel Gordo Blanca hold the first place, while Malaga and Feherzagoes are used to a small extent; the seedless varieties are Thompson's Seedless and Sultanas.

Estimated Raisin Crop of 1915 by Counties (pounds).

County	Muscats	Thompson's	Sultanas	Malagas	Feherzagoes	Dried grapes	Total*
Fresno	127,528,000	17,972,000	7,192,000	1,026,000	478,000	1,286,000	155,806,000
Kings	16,240,000	†324,000 468,000	386,000				17,100,000
Tulare	10,178,000	2,930,000	3,218,000	226,000	10,000	2,000	16,564,000
Madera	1,656,000	28,000	20,000	64,000	16,000		1,784,000
Yuba	68,000	44,000					1,588,000
San Bernardino	940,000	†1,476,000 8,000	361,000				1,312,000
Merced	6,000	74,000	6,000	24,000			110,000
Stanislaus	60,000		4,000	2,000			66,000
San Diego	570,000						570,000
Totals	157,246,000	23,330,000	11,190,000	1,342,000	504,000	1,288,000	194,900,000
Additional outside							61,100,000
							256,000,000

*In addition to these totals about 30,000 tons were packed by outside packers.
†Bleached.

Consumption of Raisins.

Efforts have been made especially in the last two years to increase the consumption of raisins, and there is no reason why they should not prove successful, as there is ample room for a greatly extended use of this wholesome fruit. The United Kingdom, with a population of less than half that of the United States, consumes annually about 73,000,000 pounds of raisins and 142,000,000 pounds of currants, or a total of about 215,000,000 pounds, equal to five pounds per capita. In the United States the consumption is less than one pound and a half per capita. In other words, if the American public appreciated raisins as they have been for centuries in Europe, the acreage in raisin grapes might be more than doubled without causing overproduction.

It was in 1892 that the California raisin crop first equaled that of Spain, and it has been increasing the difference ever since. Fresno County alone produces nearly double the quantity of raisins produced in Spain, which held the lead for centuries.

The Spanish raisin crop in 1915 was estimated at about 10,500,000 pounds, or the lowest in ten years. The prices ranged so high, however, that the growers made more money than they have for years. Starting in September with quotations of from $6.75 to $9.65 per hundredweight of 112 pounds, according to the grade, they finally reached $8.68 to $13.50, respectively.

The Raisin Crop of the World.

Year	Short tons of 2,000 pounds	In long tons of 2,240 pounds			Australia (Victoria and South Australia), pounds	
	California	Spain	Turkish Sultanas	Greek currants	Raisins	Currants
1904	40,000	25,000	34,100	151,000	7,449,116	2,004,427
1905	37,000	28,200	58,300	160,000	4,367,181	2,093,076
1906	45,000	15,800	27,500	135,000	6,148,168	2,346,980
1907	70,000	27,000	47,000	156,000	12,796,000	2,922,192
1908	65,000	26,000	45.000	185,000	10,427,760	3,404,464
1909	70,000	24,000	50,000	185,000	10,924,816	4,074.336
1910	56,000	19,000	15,000	123,000	12,191,424	7,107,520
1911	51,000	15,000	25,000	157,000	12,775,056	7,465,360
1912	85,000	12,000	50,000	167,000	15,408,400	10,470,208
1913	65,000	18,500	30,000	161,000	16,231,600	11,261,040
1914	91,000	13,500	*	145,000	17.455,312	12,462,016
1915	128,000	10,500	*	125,000	16,386,832	5,969,712

*No reliable figures owing to the war, but the quantity imported into the United States was 2,730,338 pounds in 1914, and 1,056,574 in 1915.

Raisins and Currants in Australia.

The raisins and currants produced in Australia are mostly consumed at home. The quantity at present, though not large, is increasing. Victoria and South Australia are the two states with the largest production. The severe drought in 1915 greatly reduced the crop, as the following figures will show:

	Raisins, 1914	Sultanas 1914	Total, 1914
Victoria	4,608,352	8,865,584	13,473,936
South Australia	2,132,480	1,848,896	3,981,376
Totals	6,740,832	10,714,480	17,455,312

	Raisins, 1915	Sultanas, 1915	Total, 1915
Victoria	2,664.144	9,768,528	12.432,672
South Australia	1,710,464	2,243,696	3,954,160
Totals	4,374,608	12,012,224	16,386,832

	Currants, 1914	Currants, 1915
Victoria	6,954,976	3,195.024
South Australia	5,507,040	2,774,688
Totals	12,462,016	5,969,712

California Seeded Raisin Industry.

Fresno County is the center of the seeded raisin industry, where it originated. The following figures show the wonderful increase in this popular form of raisin during the last eighteen years:

Year	Tons	Year	Tons
1896	700	1906	24.000
1897	3.500	1907	26.000
1898	7.000	1908	24.000
1899	12,000	1909	28,000
1900	14.000	1910	31,500
1901	14.000	1911	33.000
1902	16,000	1912	43,000
1903	18,000	1913	49.000
1904	18,000	1914	35.000
1905	21,000	1915	50,000

Loose raisins are packed in 50-pound boxes; Thompson's Seedless in 12-ounce cartons, 45 to the case; seeded raisins in one-pound cartons, 36 to the case; also in 12-ounce, 45 to the case and a few in bulk in 25-pound boxes. Raisin clusters are packed in 5, 10 and 20-pound boxes.

Wooden trays for drying raisins. The Australian vineyardists have discarded the wooden tray for drying, and use wire netting under cover. It is said that they find that dry air and not sunlight accomplishes the best drying, and preserves the natural color better, and it was found that wire netting made good trays, and cost half that of wooden trays. The driers are roofed affairs, often extending clear across a vineyard or orchard. They are simply constructed. Posts of native timber are set about nine feet apart, and light 1 by 1½-inch pieces are nailed across them. A roof of sheet steel is placed above, and ten to twelve framed net wire trays are laid in tiers about 9 inches apart, one above the other on the crosspieces. The rain is kept out, and the air has free circulation.

THE GREEK CURRANT.

The Greek or Zante currant has been produced on a very large scale for centuries. They are the seedless variety of a peculiar dwarf grapevine producing a small black grape, or currant, of a peculiar flavor;

it is the most important crop in Greece, as it forms nearly one half of the total exports. The vineyards cover 150,000 acres, and produce the enormous total of from 300,000,000 pounds to 340,000,000 pounds in a favorable season.* About 33,000,000 pounds are imported annually.

IMPORTED ALMERIA GRAPES.

These table grapes come from the province of that name in Spain, and during the last six years their value has amounted to between $1,500,000 and $2,000,000 a year. They come into competition with late-season shipments of California Tokays, Cornichon and Emperor grapes. Cuttings of the Almeria grape have been imported into California, but the result so far has not been satisfactory.

Almeria Grapes Imported.

(Duty, 25 cents per cubic foot capacity of barrel or packages.)

Year	Cubic feet	Value
1907	1,298,469	$1,575,521
1908	2,234,508	2,743,356
1909	1,203,419	1,575,620
1910	1,365,310	1,682,994
1911	1,485,159	1,723,022
1912	2,000,841	2,331,504
1913	1,135,942	1,359,415
1914	1,334,163	1,599,969
1915	1,323,928	1,523,547

FRUIT CANNING AND PRESERVING, 1889-1909.

California made a pack of hermetically sealed fruits in tin cans in 1861. For many years after that, canned goods were a luxury, relatively expensive, and used only in emergencies, on board ship or at remote places where other food was not obtainable.

The real importance and development of the canning industry did not commence until about the year 1875. The value of its products, which in 1889 was $6,621,931, more than doubled during each of the two following decades, amounting in 1909 to $32,914,829.

The case, which is used as the unit of measure for canned fruits and vegetables in the table below, consists of 24 standard-size cans No. 2 (also called 2-pound cans) for berries, cherries and plums, and No. 3 (also called 3-pound cans) for all fruits and vegetables.

California ranks first among the states in the production of canned apricots, peaches and pears, and of dried peaches and prunes; the State had a complete monopoly of the production of dried apricots and of raisins in the United States in 1909, neither of these being produced in any other state.

The most important of the dried fruit products, both in point of quantity and of value, were raisins and prunes. The fruit most largely canned in 1909 was peaches, the value of which constituted 9.2 per cent of the total for the canning and preserving industries.

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*For details regarding the Greek currants and the "Privileged Company" which controls and markets the crop, see Report for 1912, page 140.

VARIETIES AND AVERAGE QUANTITY OF FRUIT USED IN CANNING.*

While there is a limited quantity of jams, jellies, and preserves manufactured commercially within the State, by far the larger quantity of fruit is used for canned fruit—that is, fruit that is filled into the can fresh, before cooking; sugar syrup is then put in merely for flavoring, the can is hermetically sealed and finally processed or sterilized by heat. Sugar is not essential to the keeping qualities. The preserves, jams and jellies stewed in kettles with a high percentage of sugar are not so dependent upon hermetic closure, as the sugar acts as a preservative agent. For these so-called preserves California produces suitable berries, sour cherries, peaches, plums, quinces, currants, gooseberries, apples and figs and grapes. But of greater commercial importance are the fruits that are generally used for tinned or canned fruits—apricots, peaches, pears, cherries and plums.

Apples. About 2,500 tons are canned annually in California, chiefly Newtown Pippins. The average price paid is from $10 to $12 per ton. The apples for canning purposes come largely from Sonoma, Santa Clara and Santa Cruz counties.

Apricots. In a normal season 20,000 tons of apricots are canned in California. The average price paid to growers for the past five years has been $30 per ton. The Royal Blenheim and Hemskirk varieties grown in Santa Clara Valley give the best results to the canner. Moorparks have a flavor preferred by many, and they grow to a large size.

Cherries. Royal Anne and White cherries in general are preferred. An average price would be from 5 to 6 cents per pound. About 1,200 tons of Royal Annes and Whites are used annually for canning, and probably 450 tons of Blacks.

Grapes. The Muscat or raisin grape is canned to a limited extent; about 1,000 tons are used annually at a price of about $12 to $15 per ton.

Nectarines. Nectarines are canned, but a very limited quantity is used, and the fresh and dried fruit markets are more desirable for this variety.

Peaches. The freestone varieties, such as the Muir and Lovell, are preferred. About 24,000 tons are canned annually with prices about $22.50 per ton for Lovell, and $17.50 for other varieties like the Muir and Early Crawford. In spite of the increased trouble and expense of removing the pit, Yellow Clings are the most desirable of all California canned fruits, and more of these are canned than any other variety. An average price delivered at the cannery would be about $25 per ton for Phillips and Tuscan, and $20 for other varieties. In the case of clings, a considerable demand has developed for slices. About 35,000 tons are used for canning.

Pears. About 20,000 tons of Bartlett pears are canned annually. The price paid to growers ranges from $30 to $40 per ton.

Plums. Egg plums, Green Gage, Golden Drop plums and similar varieties are used to a limited extent for canning. About 2,500 tons are used for canning, and the price is usually from $15 to $20 per ton.

Berries. Blackberries have been produced in large quantities chiefly in Sonoma County, and are used extensively by canners. The Mammoth and Lawton varieties are most common. About 2,000 tons are used by canners and makers of preserves. The price has ranged about $40 per ton. Far better results are obtained from Loganberries. In its fresh form the price ranges from $55 to $75 per ton. Canners use about 750 tons.

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*See address before the State Fruit Growers' Convention, Davis, June, 1914, by C. H. Bentley, Sales Manager, California Fruit Canners Association, San Francisco.

Strawberries. The varieties commonly grown are comparatively soft and juicy, suitable for jams and jellies, but not for preserves. Such are the Dollar and Jessie varieties of the Florin district near Sacramento, and the Banner and Malinda berries of the Watsonville district in Santa Cruz County. The Longworth of the Alviso and Santa Clara districts has become too small to give satisfaction to the canner. These varieties ordinarily bring $60 to $70 per ton, while the Clarke, Wilson and other similar varieties grown in Oregon bring $100 per ton. About 800 tons are used by canners and preservers, but a much larger quantity could be used of better varieties.

With raspberries, also, the canners find better results from Oregon fruit, because it is firmer and higher in color. The Cuthbert and Antwerp varieties are preferred for canning. Canners use about 100 tons.

Gooseberries are used in a limited way for jams and jellies.

Calimyrna and White Endish Figs are used to some extent. Texas seems to be able to grow a small white fig of good quality and this is canned to a considerable extent. There would seem to be an opportunity for development in California.

Damson Plums are needed for preserves, jams and jellies, they bring $35 to $40 per ton when ordinary varieties like the Gage and Egg Plums, are selling for $15. There are very few grown at the present time.

Concord Grapes are needed for jams and jellies; the want is partly filled by the Isabella variety.

Quinces which were for years a drug on the fall fruit market now bring $25 to $30 per ton.

Crabapples are in short supply, commanding a price of 4½ to 5 cents a pound.

Sour Cherries are also used in a limited way.

PRODUCTION OF GREEK CURRANTS AND ALMERIA GRAPES IN CALIFORNIA AND AUSTRALIA.

Several attempts have been made to produce Greek currants in California, but so far without success. A few years ago samples were exhibited at the Fresno County District Fair, but they were of poor quality.

Almeria grapes are another fruit that we ought to be able to produce in California under suitable conditions, but very few attempts have been made, and they have all resulted in failure. Both the Almeria grape and Greek currants are grown with success in Australia, and the Government Viticulturist of Victoria, Australia, in a recent letter expresses his surprise at these conditions, saying: "I note that you still import over a million dollars' worth of Greek currants. It seems strange that you do not grow any locally, as the Zante currant should do well in the California climate. It thrives admirably in the irrigation districts of Northern Victoria, yielding as much as three tons of dried currants to the acre, whereas the Sultana, which also does very well with us, rarely exceeds two tons.

"You refer to the vine as 'a peculiar dwarf grapevine.' It could, of course, be trained thus, but here we grow it on very large trellises, planting the vine as much as 15 feet apart. The Zante was not a success here until cincturing, or ringbarking, was introduced a dozen years ago. This operation is performed on the main stem during, or immediately after, blossoming. Without it the bulk of the fruit drops off. Since cincturing proved a success the Zante was very extensively planted, and we now produce more currants than the commonwealth can consume, with the result that prices fell considerably from $200 to $115 per ton. They have risen again recently, owing to last year's crop only being a half one.

"I am rather astonished that the Almeria grape has not proved satisfactory with you, since it is doing splendidly with us. You may, perhaps, have seen some Victorian-grown Ohanez grapes (the Almeria variety) at the Panama Exposition. It keeps here in good condition for six months and over in cool store. It has occurred to me that a peculiarity in its method of fruiting may have something to do with its non-success in California.

"A recent Bulletin issued by the United States Department of Agriculture on the raisin industry confirms this view regarding Greek currants. It states in part: 'Currants have not so far been grown to any great extent in this country, not because they will not thrive here, but no one has engaged in their culture seriously enough to determine the right way to grow, prune and train them. * * * The Department of Agriculture for some years has made experiments in the growing of currant varieties of grapes on different resistant stocks and practiced on them different methods of pruning and training, with very gratifying results, and strong hopes are entertained of starting and developing this special line of the raisin industry. There seems to be no reason why this country should not produce the 35,356,000 pounds, or $1,206,000 worth of currants it has for ten years been annually importing.' "

TABLE GRAPES.

According to the report of the State Board of Viticultural Commissioners, the season of 1915 was a comparatively remunerative one to the table grape shippers of the State. It followed a most depressing season of 1914, during which a great majority of table grape shippers realized no profit, most of them suffered severe financial losses and for this reason the revival in 1915 was all the more appreciated.

In point of actual tonnage of grapes the crop in 1915 was considerably short of the normal, and notably in the American River district there was only 50 per cent of a crop. However, the stand of the fruit was better, and the long dry season permitted of picking and packing practically all of the fruit that hung on the vines. This brought up the total tonnage of table grapes in the State to a figure considerable in excess of a normal pack, and the prices realized were good.

From the best information gathered from authentic sources there were 9,564 carloads of grapes shipped out of California during 1915. There was a total of 1,000 carloads either consumed in the State or sent out in light express shipments. Out of this total of 10,564 carloads, 500 cars were packed in kegs or drums in redwood sawdust as a preservative.

Of the total shipments out of the State there were 750 carloads of wine grapes sent to the eastern markets, leaving a balance of 9,314 cars of table grapes produced and packed in the State, chiefly in crated form. A small proportion of this amount was shipped, however, in lug boxes, under refrigeration, to eastern points by way of experiment. Estimating that there are 13 tons of crated table grapes in a carload and 8 tons of grapes in a car containing grapes preserved in redwood sawdust, the total tonnage of table grapes produced in the State amounts to 125,082 tons.

It is estimated that the selling price of 8,814 cars of table grapes shipped East was $8,814,000. The selling price of 1,000 cars consumed in the State and sent out in light express shipments was $700,000, making a total selling value of the table grape crop of California for 1915 $9,514,000.

A factor influencing for the benefit of the grower the eastern selling price of our 1915 table grapes was the short crop produced in the eastern states during last season owing to late frosts in the Concord belts from Michigan to New York which greatly curtailed the production in that section, and the advantage, necessarily, was reaped by the California shippers.

CANNED AND DRIED FRUITS, 1899-1909.

(Compiled from the Census Reports.)

Canned Fruits.

Product	1899		1904		1909	
	Cases	Value	Cases	Value	Cases	Value
Apples	25,287	$71,427	31,286	$67,591	67,697	$136,855
Apricots	531.568	1,582,927	532,038	1,619,757	560,186	1,819,558
Berries	87,564	218,733	67,467	168,640	108,672	200,094
Cherries	49,375	155,813	171,298	457,169	213,518	463,476
Peaches	903,676	3,103,775	744,715	2,640,524	1,166,627	3,013,203
Pears	444,343	1,610,900	524,197	1,577,823	436,272	1,316,022
Plums	358,298	596,484	196,379	349,307	138,477	230,384
All other	------------	------------	54,215	97,272	19,900	68,750
Totals	------------	$7,340,059	------------	$6,978,083	------------	$7,248,342

Dried Fruits, 1899-1909.

(From the Census Reports.)

Dried fruits	1899		1904		1909	
	Pounds	Value	Pounds	Value	Pounds	Value
Apples	3,087,220	$155,893	811,254	$40,659	6,860,170	$481,173
Apricots	5,310,217	442,544	19,559,573	1,410,838	29,205,569	2,277,177
Peaches	5,502,390	301,495	25,845,364	1,701,105	46,827,391	2,422,043
Prunes	24,102,329	907,041	114,580,431	3,169,878	118,917,876	4,394.922
Raisins	10,734,221	720,268	121,409,881	6,349,381	195,774,767	6,912,533
All other	601,506	42.279	18,102,416	1,128,740	26,140,777	1,724,468
Totals	49,337,883	$2,569,520	300,308,919	$13,800,601	423,726,550	$18,212,316

Fresno city is one of the principal centers of the canning and preserving industry of the State, in 1909 reporting nearly one-fourth of the total value of products for this industry in California and a much larger proportion of the total value of dried fruits.

CANNED FRUIT PACKED. BY VARIETIES, 1912-1915.

Varieties	Cases, 1912	Cases, 1913	Cases, 1914	Cases, 1915 (estimated)
Apples	72,500	79,000	96,407	70,500
Apricots	863,000	650,000	1,147,781	820,000
Blackberries	826,000	70,000	101,777	95,200
Cherries	351,250	287,700	123,839	140,300
Grapes	66,600	30,000	49,685	70,600
Peaches†	2,200,000	1,995,300	3,514,519	24,200
Pears	1,062,000	700,000	805,740	3,200,500
Plums	241,000	145,000	113,208	770,100
Figs	1,500	----------	----------	----------
Loganberries	20,000	17,500	22,977	110,500
Raspberries	2,000	6,000	9,685	24,200
Strawberries	4.500	20,000	6,582	5,400
Quinces	20,000	----------	----------	----------
Currants	15,000	----------	----------	----------
Oranges	4,000	----------	----------	----------
Other fruits	----------	15,000	43,869	25,000
Totals	5,605,950	4,015,500	6,118,069	5,357,100

†Including nectarines.

The leading varieties of fruits used for canning are as follows:

Apricots—
  Moorpark
  Hemskirke
  Blenheim
  Royal
Cherries—
  Royal Anne
  Centennial
  Rockport
  Black Tartarian

Figs—
  Endish
Grapes—
  Muscat
Pears—
  Bartlett
Nectarines—
  Stanwich

Plums—
  Reine Claude
  Green Gage
  Washington
  Damson
  Jefferson
  Egg
  Golden Drop

Peaches—
  Clingstones:
    Philip
    Tuscan
    Golden Cling
  Freestones:
    Lovell
    Muir
    Crawford
    Foster

Dried Fruit Packed, 1911-1914.

Varieties	Tons, 1911	Tons, 1912	Tons, 1913	Tons, 1914	Tons 1915
Prunes	95.000	100,000	45,000	60,000	82,000
Raisins	60,000	92,500	65,000	91,000	128,000
Peaches	13,500	28,000	20,000	35,000	28,000
Apricots	11,000	19,000	9,000	20,000	16.000
Pears	2,000	5,000	2,000	4,000	1,000
Figs	5,000	4,500	3,500	5,000	7,000
Apples	4,000	3,500	2,500	5,000	4,000
Miscellaneous	3,800	1,000	2,000	5,000	1,000
Totals	194,300	253,500	149,000	224,000	267,000

The varieties of fruit cured by drying are as follows:

Apricots—
  Royal
  Blenheim
Figs—
  Adriatic

Peaches—
  Lovell
  Muir
  Crawford
  Foster

Nectarines—
  Stanwich
Pears—
  Bartlett

Plums—
  Washington
  Jefferson
  Egg
Prunes—
  Petites

Dried fruit is packed in boxes of 25 and 50 pounds, and 12½ kilos for abroad.

NUTS.

About three fourths of the nuts produced in the United States are grown in California, walnuts and almonds being the principal crops.

Walnuts in the United States are produced almost exclusively in California, Orange and Los Angeles counties taking the lead.

California produces practically the whole of the almond crop in the United States.

Peanuts thrive well in southern California, chiefly on the lower lands of the coast region, while in central and northern California, peanuts are mostly grown in the river bottoms of the Sacramento and San Joaquin valleys.

The pecans grow well in the lower lands of the interior valleys, but are raised in only limited quantities. The most favorable reports of pecan production on the Pacific coast have come from the interior valleys of central and northern California. Very favorable reports have been received from small orchards and scattered trees (mainly seedlings) from Chico, Woodland, Winters, Vacaville, Elk Grove, Stockton, Farmington, Patterson, Fresno, and Bakersfield. Reports from Anaheim and Whittier, in southern California, where great trouble is experienced with pecan rosette, have been much less encouraging. In the opinion of one of the leading practical horticulturists of the San Joaquin Valley, the pecan offers greater inducements for that particular section than does the almond or the walnut (Persian).

Walnuts.

The English walnut is the greatest nut grown in the State, judged by the size and value of the crop. It is almost entirely grown in the four southern counties of Santa Barbara, Los Angeles, Orange and Ventura.

The production of walnuts has doubled in the last ten years, until the domestic supply produces half the quantity consumed in the United States. In 1913 the crop was about 22,378,354 pounds, of which amount 1,224,302 pounds were so badly damaged by the hot wave which visited southern California in September that they were marked as off-grade, at a considerably lower price than the standard grade of walnuts. In 1914 the crop amounted to 17,780,000 pounds, and in 1915 28,600,000 pounds, some 6,000,000 pounds higher than any previous year, but on account of a few hot days late in August, the quality of the walnuts was not so high as the previous season. On account of the large crop, practically the largest ever handled, and on account of the quality, the prices were much lower than usual.

The price for the last two years is as follows:

Grade	Price per pound, 1913 (cents)	Price per pound, 1914 (cents)	Price per pound, 1915† (cents)
No. 1 soft shells	16	16½	13½
Fancy budded	19	20	17
No. 2	11	12	10½
Jumbos	17½	*18½	16½

*Later reduced to 17 cents.

†Later the price on Fancy was advanced to 17½ and on No. 1 Soft Shell to 14.

The bulk of imported nuts are of the Marbot and Cornes varieties, which correspond in size and quality to the second grade of the Pacific coast production. There are about four million pounds of Naples walnuts imported from Italy annually, and these are the greatest competitors of the California product, as they are of high quality and bring a high price on the market. The total quantity of walnuts imported in 1914 was 37,195,728 pounds.

Almonds.

The production of almonds in California in 1914 was 5,000.000 pounds, compared with 2,200,000 the previous year. In 1915 it amounted to 7,000.000 pounds. The net prices paid to growers, after all expenses of warehousing and selling had been paid, by the Almond Growers' Exchange, which controls about 60 per cent of the crop, is as follows:

Grade	Price, cents, 1911	Price, cents, 1912	Price, cents, 1913	Price, cents, 1914	Price, cents, 1915
Nonpareil	16½	13	17½	18	13
I X L	15½	12¼	17	16½	12
Ne Plus Ultra	14½	11¼	16	15½	11
Drake Seedling	12	9¾	13	13	9¼
Hardshell	8	7	8½	8	7

CANTALOUPES AND WATERMELONS.

It is not realized, generally, by cantaloupe growers, to what extent the commercial production of this fruit has advanced during the last ten years in all the states where they are raised. The number of cars shipped in the United States in 1914, amounted to 16.401. California is by far the largest producer, followed by Colorado, Delaware, Indiana, Georgia and North Carolina. The following summary shows the leading districts where they are grown.

California Shipments in 1914 (May 15 to August 1).

	Carloads		Carloads
Brawley	2,411	Sultana	26
Heber	777	Coachella	21
Keystone (Grape)	606	Thermal	20
Turlock	524	Imperial	4
Calexico	438	Meloland	3
Keyes	164		
El Centro	152	State total	5,146

Increase in Shipments from Imperial Valley, 1905-1910.

	Carloads		Carloads
1905	297	1910	1,621
1906	577	1911	2,580
1907	611	1912	2,887
1908	1,891	1913	3,502
1909	1,411	1914	4,480

The acreage in California in 1915 was estimated to be 11,674, and for the United States 41,981 acres. In watermelons California had 5,503 acres, and the United States 96,508 acres.

CALIFORNIA FRUIT AND NUT CROPS

1891-1915.

Imports and Exports of Apples, Apricots, Figs, Oranges, Lemons, Olives, Nectarines, Pears, Peaches, Prunes, Plums, Raisins, Dried Grapes, and Greek Currants.*

CANNED FRUITS, NUTS, ALMONDS, WALNUTS AND APPLES (DRIED), 1891-1915.

(None imported.)

Year	California crop, pounds	Exported	
		Pounds	Value
1891	1,800,000	6,973,168	$409,605
1892	2,750,000	26,042,003	1,288,102
1893	3,800,000	7,966,819	482,085
1894	5,850,000	2,846,645	168,054
1895	4,560,000	7,085,946	461,214
1896	2,350,000	26,691,963	1,340,507
1897	5,250,000	30,775,401	1,340,159
1898	3,520,000	31,031,254	1,897,725
1899	5,900,000	19,305,739	1,245,733
1900	6,360,000	34,964,010	2,247,851
1901	6,450,000	28,309,023	1,510,581
1902	9,750,000	15.664,468	1,190,593
1903	3,600,000	39,646,297	2,378,635
1904	3,000,000	48,301,665	2,791,421
1905	6,500,000	39,272,890	2,208,414
1906	5,500,000	27,852,831	2,044,820
1907	3,600,000	45,697,948	3,166,946
1908	6,800,000	24,237,873	1,946,810
1909	5,800,000	33,474,634	2,339,936
1910	6,200,000	25,076,618	2,056,692
1911	9,000,000	21,804,086	1,944,209
1912	6,500,000	53,664,639	4,545,971
1913	3,600,000	41,574,562	2,898,211
1914	8,000,000	33,563,160	2,628,445
1915	8,000,000	42,589,169	3,270,658

Dried Apples Exported in 1915.

Country	Pounds	Value
Denmark	17,820,846	$1,363,829
Sweden	10,748,504	845,041
Netherlands	5,200,178	430,181
United Kingdom	5,098,725	338,981

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*For figures previous to 1890, see the Report for 1913, pages 131–143.

APRICOTS (DRIED), 1891-1915.

(None imported).

Year	California crop, pounds	Exported	
		Pounds	Value
1891	13,500,000		
1892	12,500,000		
1893	9,500,000		
1894	28,750,000		
1895	10,650,000		
1896	6,740,000		
1897	30,125,000		
1898	8,240,000		
1899	11,600,000		
1900	28,080,000		
1901	15,750,000		
1902	37,525,000	1,928,367	$178,143
1903	21,000,000	9,190,081	713,887
1904	17,000,000	7,205,686	608,511
1905	38,500,000	6,854,154	606,777
1906	6,500,000	13,760,281	1,325,422
1907	3,000,000	2,760,432	336,812
1908	36,000,000	1,224,602	229,467
1909	32,000,000	16,597,871	1,512,417
1910	33,500,000	12,028,834	1,218,423
1911	14,000,000	19,329,358	2,085,437
1912	35,500,000	13,413,430	1,885,855
1913	18,000,000	35,016,730	3,513,473
1914	40,000,000	17,401,692	1,937,771
1915	32,000,000	23,764,342	2,241,061

Dried Apricots Exported in 1915.

Country	Quantity	Value
United Kingdom	9,017,358	$452,456
Denmark	4,314,206	382,427
Sweden	2,048,027	184,188
France	1,911,296	192,781
Netherlands	1,285,632	133,359

FIGS, 1891-1915.

(Duty, 2 cents per pound.)

Year	California crop, pounds	Imported	
		Pounds	Value
1891	365,000	9,201,565	$697,562
1892	500,000	8,338,759	511,142
1893	890,000	10,503,928	548,995
1894	1,540,000	7,985,959	392,040
1895	2,750,000	11,855,890	587,420
1896	2,160,000	11,900,710	639,512
1897	3,250,000	8,940,762	535,380
1898	4,780,000	9,628,426	509,002
1899	5,800,000	7,284,058	356,762
1900	4,000,000	8,812,487	513,895
1901	6,500,000	9,933,871	458,513
1902	7,250,000	11,087,131	487,733
1903	6,000,000	16,482,142	775,917
1904	5,700,000	13,178,061	660,360
1905	7,250,000	13,364,107	617,027
1906	7,750,000	17,562,358	722,967
1907	6,000,000	24,346,173	1,136,924
1908	6,000,000	18,836,574	867,523
1909	7,500,000	15,235,513	691,981
1910	6,250,000	17,362,197	775,319
1911	8,000,000	23,459,728	1,059,340
1912	10,000,000	18,765,408	934,763
1913	11,100,000	16,837,819	944.317
1914	10,000,000	19,284,868	941,207
1915	14,000,000	20,779,730	1,024,495

Nearly all the figs are imported from Smyrna, in Turkey in Asia, about two million pounds from Greece and smaller quantities from Italy and Spain.

Exports of domestic figs are not shown separately in the customs returns, but are included in "All other green, ripe, or dried fruits."

OLIVES, 1907-1915.

(Duty, 15 cents per gallon.)

Year	Imported	
	Gallons	Value
1907	2,298,480	$1,277,973
1908	3,121,788	1,358.897
1909	2,969,329	1,349,023
1910	4,555,975	1,659,801
1911	3,044,947	1,567,546
1912	5,076,857	2,303,277
1913	3,946,076	1,896,982
1914	5,316,364	2,292,837
1915	3,622,275	1,607,903

NOTE.—Olives in California, although cultivated on a considerable scale, have generally been considered one of the minor crops, and no regular records of the crop have been kept until the last few years. A large acreage has been planted in the last two or three years. Previous to 1907 the imports of olive oil were not given separately in the customs returns.

Most of the olives imported into this country come from Italy; France ranking second.

Exports of domestic olives and olive oil are not shown separately in the customs returns, but included in "All other fruits, or oils."

OLIVE OIL, 1891-1915.

Imports.

(Duty, in cask, 20 cents per gallon; in bottles, 30 cents per gallon. Olive oil unfit for food, free.)

Year	For manufacturing or mechanical purposes		For table use	
	Gallons	Value	Gallons	Value
1891	*	*	605,509	†$733,489
1892	*	*	706,486	†876,613
1893	*	*	686,852	†891,424
1894	*	*	757,478	†909,897
1895	*	*	775,046	†952,405
1896	*	*	942,598	†1,107,049
1897	*	*	928,567	†1,134,077
1898	*	*	736,877	†923,804
1899	*	*	930,042	†1,090,250
1900	*	*	967,702	†1,170,871
1901	*	*	983,059	†1,266,293
1902	*	*	1,339,097	†1,579,409
1903	*	*	1,494,132	†1,736,648
1904	*	*	1,713,590	†1,875,825
1905	*	*	1,923,174	†2,108,893
1906	2,538,366	$1,105,876	2,447,131	2,566,994
1907	1,471,766	682,656	3,449,517	3,523,725
1908	1,565,253	703,829	3,799,112	3,876,901
1909	369,979	183,983	4,129,454	5,069,655
1910	842,926	477,679	3,702,210	4,869,114
1911	578,477	378,819	4,405,827	6,014,191
1912	636,013	389,539	4,836,515	6,170,882
1913	619,356	407,074	5,221,001	6,739,172
1914	763,924	477,210	6,217,560	7,916,980
1915	653,064	450,001	6,710,967	8,225,485

NOTE.—No record has been kept of the annual output of California olive oil until recently, although the amount has been considerable for some years.

*Included in "Olive oil for table use."

†1885–1905 includes olive oil for manufacturing purposes.

CALIFORNIA ORANGE AND LEMON CROP, 1891-1915.

(Carloads.)

Season	Southern California		Total, carloads	Northern and Central California*		Grand total, carloads
	Lemons	Oranges		Oranges	Lemons	
1890-91	40	4,016	4,056			
1891-92	52	4,400	4,452			
1892-93	65	5,871	5,936			
1893-94	145	5,726	5,871			
1894-95	335	4,687	5,022			
1895-96	565	7,010	7,575			
1896-97	1,378	5,972	7,350			
1897-98	1,166	13,987	15,153			
1898-99	903	9,448	10,351			
1899-1900	1,447	16,362	17,809			
1900-01	2,924	21,173	24,097			
1901-02	2,816	17,571	20,387			
1902-03	2,649	19,776	22,425	†1,304		23,729
1903-04	2,782	25,117	27,899	†1,567		29,466
1904-05	4,274	25,608	29,882	†1,734		31,616
1905-06	3,789	22,175	25,964	†1,564		27,528
1906-07	3,507	23,986	27,493	†2,333		29,826
1907-08	4,959	24,538	29,497	‡3,150		32,647
1908-09	6,196	31,875	38,071	†2,501		40,572
1909-10	4,782	25,331	30,113	2,921	109	33,143
1910-11	6,764	36,821	43,585	2,687	127	46,399
1911-12	5,961	30,327	36,288	4,220	172	40,680
1912-13	2,192	13,574	15,766	2,453	112	18,331
1913-14	2,954	39,024	41,978	6,282	78	48,338
1914-15	6,843	33,317	40,160	6,427	225	46,812

*Lemons and oranges not reported prior to 1902-03 and not shown separately until 1909. The number of boxes per car of oranges and lemons has varied considerably, as the size of cars in recent years has increased. In 1904-05, and prior to that date, oranges averaged about 374 boxes and lemons 313 boxes to the car. At the present time the numbers are about 396 for oranges and 336 for lemons.

†Including lemons.

Imports and Exports of Oranges, 1891-1915.

(Duty, in packages exceeding 5 cubic feet, or in bulk, ½ of 1 cent per pound.)

Year	Exports		Imports	
	Boxes	Value	Pounds	Value
1891				$2,339,987
1892				1,210,338
1893				1,695,469
1894				1,127,005
1895				1,997,266
1896				2,694,131
1897				2,324,907
1898		$339,396		886,722
1899		282,313		1,097,596
1900		271,468	68,618,938	1,087,041
1901		436,560	50,332,914	716,457
1902		420,835	52,742,476	784,640
1903		465,397	56,872,070	818,780
1904		739,593	35,896,260	525,468
1905		929,151	28,880,575	374,088
1906		1,110,993	31,134,341	456,726
1907		1,255,104	21,267,346	354,495
1908	654,251	1,577,661	18,397,429	275,060
1909	866,753	2,131,724	8,435,873	137,390
1910	932,118	2,213,905	4,676,118	82,457
1911	1,179,273	2,983,322	7,672,186	116,658
1912	1,197,363	3,022,859	7,628,662	108,880
1913	1,063,233	2,976,520	12,252,960	233,760
1914	1,558,921	3,824,889	*	93,472
1915	1,759,405	3,851,013	*	50,022

NOTE.—In years for which no figures are given, oranges were included in "Other fresh or dried fruits." Oranges are mostly imported from Mexico, West Indies, and Italy. The bulk of California oranges exported go to Canada.

*Quantity of oranges and lemons imported not given since 1913.

Imports of Lemons and Limes, 1891-1915.

(Duty, in packages exceeding 5 cubic feet, or in bulk, ½ cent per pound.)

Year	Pounds	Value	Year	Pounds	Value
1891		$4,351,970	1904	171,923,221	$3,659,598
1892		4,548,263	1905	139,084,321	2,905,082
1893		4,994,328	1906	138,717,252	2,933,990
1894		4,285,278	1907	157,859,906	4,253,296
1895		3,917,326	1908	178,490,003	4,388,530
1896		5,040,344	1909	135,183,550	2,623,399
1897		4,043,822	1910	160,214,785	3,136,933
1898		2,848,130	1911	134,968,924	2,985,561
1899		4,398,004	1912	145,639,396	3,368,863
1900	160,198,056	3,666,881	1913	151,416,412	4,300,266
1901	148,514,614	3,516,856	1914	*	5,981,635
1902	164,075,309	3,320,359	1915	*	3,720,075
1903	152,004,213	3,079,221			

NOTE.—Of the imported lemons in 1912, 145,275,122 pounds came from Italy, and the balance of 364,274 from other countries. The exports of domestic lemons were not shown separately in the customs returns until 1913, but were included under "All other" fruit.

*The quantity is not stated after 1913.

PEACHES AND NECTARINES (DRIED), EXPORTED, 1891-1915.

(None imported.)

Year	California crop, pounds			Exported	
	Peaches	Nectarines	Total	Pounds	Value
1891	12,250,000	625,000	13,875,000	----------	----------
1892	13,500,000	720,000	14.220.000	----------	----------
1893	16,800,000	780.000	17,580,000	----------	----------
1894	30,540,000	1,250,000	31,790,000	----------	----------
1895	24,500,000	1,325,000	25.825,000	----------	----------
1896	16,460,000	625.000	17,085,000	----------	----------
1897	27,150,000	285.000	27,435,000	----------	----------
1898	10.960.000	190,000	11,150,000	----------	----------
1899	34,800,000	840,000	35,640,000	----------	----------
1900	34,340,000	870.000	35,210,000	----------	----------
1901	29,510,000	650,000	30,160,000	----------	----------
1902	50.420,000	910,000	51,330,000	----------	----------
1903	36,000,000	635,000	36,635,000	----------	----------
1904	23,000,000	420,000	23,420,000	----------	----------
1905	35.000.000	370,000	35,370,000	----------	----------
1906	22.500.000	340,000	22,840,000	1,181,649	$110,407
1907	24,000,000	275,000	24,275,000	1,757,650	186,043
1908	48,000.000	525,000	48,525,000	1,148,598	144,318
1909	40,000,000	750,000	40,750,000	2,403,430	151,334
1910	50,000,000	500,000	50,500,000	2,617,069	151,520
1911	22,000,000	800,000	22,800,000	7,125,014	499,530
1912	53,000,000	500,000	53,500,000	4,425,803	422,766
1913	40,000,000	400,000	40,400,000	6,529,633	444,879
1914	69,400,000	600,000	70,000,000	6,712,296	449,549
1915	56,000,000	400,000	56,400,000	14,464,655	834,813

NOTE.—Included in "All other green, ripe, or dried fruits" in the years where no figures are given.

PEARS, EXPORTED, 1891-1915.

(None imported.)

Year	California crop, dried pears, pounds	Exported green or ripe, value
1891	11,000,000	----------
1892	2,250,000	----------
1893	2,640,000	----------
1894	6,530,000	----------
1895	5,400,000	----------
1896	3,650,000	----------
1897	6,350,000	----------
1898	6,620.000	----------
1899	5,760,000	----------
1900	14,550,000	----------
1901	6.510.000	----------
1902	5,250,000	----------
1903	4,650,000	----------
1904	3,500,000	----------
1905	3.500.000	----------
1906	7,000,000	$631,972
1907	1,000,000	675,944
1908	5,000,000	288,918
1909	2,500.000	546,198
1910	2,000,000	302,958
1911	4,000,000	578,067
1912	3.500.000	784.627
1913	2.000,000	796.913
1914	3,000,000	1,402,924
1915	2.000,000	992,497

NOTE.—Included under "All other green, ripe, or dried fruit" in the years where no figures are given. Dried pears are not shown separately. Pears are mostly exported to the United Kingdom and Canada.

DRIED PRUNES, 1891-1915.

(Duty, 1 cent per pound.)

Year	California crop, pounds	Exports	
		Pounds	Value
1891	13,875,000		
1892	22,500,000		
1893	52,180,000		
1894	44,750,000		
1895	64,500,000		
1896	55,200,000		
1897	97,780,000		
1898	90,420,000	15,940,791	$1,021,888
1899	112,900,000	5,615,565	380,847
1900	174,000,000	25,922,371	1,646,332
1901	81,600,000	10,021,564	589,113
1902	195,000,000	23,358,849	1,404,422
1903	165,000,000	66,385,215	3,512,507
1904	135,000,000	73,146,214	3,410,497
1905	70,000,000	54,993,849	2,455,056
1906	180,000,000	24,869,744	1,410,636
1907	105,000,000	44,400,104	2,400,960
1908	57,000,000	28,148,450	1,612,114
1909	150,000,000	22,602,288	1,078,210
1910	75,000,000	89,014,880	4,016,554
1911	140,000,000	51,030,711	3,271,971
1912	200,000,000	74,328,074	4,969,053
1913	90,000,000	117,950,875	6,655,870
1914	120,000,000	69,813,711	4,662,546
1915	164,000,000	43,478,892	3,274,197

The largest quantity of prunes exported go to Germany and Canada; the imports of prunes are included with plums.

PLUMS, 1891-1915.

(Duty, 1 cent per pound.)

Year	California plum crop, pounds	Imports of plums and prunes	
		Pounds	Value
1891	1,250,000	34,281,322	$2,054,486
1892	2,000,000	10,869,797	437,271
1893	1,500,000	26,414,112	1,162,318
1894	2,760,000	9,908,122	416,342
1895	4,500,000	14,352,057	527,625
1896	2,100,000	483,658	68,862
1897	3,250,000	710,028	73,303
1898	2,460,000	303,992	39,660
1899	3,360,000	600,360	63,574
1900	3,900,000	443,457	47,700
1901	3,450,000	745,974	62,880
1902	2,560,000	522,478	44,077
1903	2,870,000	633,819	63,218
1904	2,300,000	494,105	46,976
1905	1,860,000	671,604	63,617
1906	2,000,000	497,494	53,348
1907	1,500,000	323,377	45,386
1908	1,000,000	335,089	49,322
1909	1,200,000	296,123	41,696
1910	750,000	*	*
1911	1,200,000	*	*
1912	750,000	*	*
1913	1,200,000	*	*
1914	1,500,000	*	*
1915	1,900,000	*	*

*Included in "All other fruits" after 1909, the quantity being so small.

CALIFORNIA RAISIN CROP, AND EXPORTS AND IMPORTS, 1891-1915.

(Duty on raisins and dried grapes, 2 cents per pound.)

Year	California crop, pounds	Exports		Imports	
		Pounds	Value	Pounds	Value
1891	52,000,000	------	------	39,572,655	$2,018,879
1892	57,000,000	------	------	20,687,640	964,309
1893	85,000,000	------	------	27,543,563	1,266,342
1894	103,000,000	------	------	13,751,050	554,081
1895	91,000,000	------	------	15,921,278	651,420
1896	68,000,000	------	------	10,826,094	460,200
1897	93,000,000	------	------	12,650,598	567,039
1898	80,000,000	3,109,639	$167,062	6,593,833	381,889
1899	71,000,000	4,659,807	242,620	4,933,201	282,400
1900	90,000,000	2,415,456	139,689	10,309,498	531,124
1901	74,000,000	3,512,164	218,715	3,860,836	297,631
1902	106,000,000	2,323,274	149,216	6,683,545	399,973
1903	120,000,000	4.280,028	284,530	6,715,675	476,844
1904	75,000,000	4,020,418	281,402	6,867,617	355,542
1905	87,000,000	7,054,824	372,087	4,041,689	273,031
1906	95,000,000	4,528,502	305,768	12,414,855	524,590
1907	140,000,000	9,128,827	599,395	3,967,151	364,403
1908	130,000,000	5,684,541	427,583	9,132,353	554,633
1909	140,000,000	7,880,161	455,657	5,794,320	327,644
1910	115.000,000	8,526,114	417,403	5,042,683	296,047
1911	120,000,000	18,659,992	1,069,300	2,479,220	237,422
1912	185,000,000	19.949,046	1,351,986	3,255,861	295,466
1913	130,000,000	28,120,507	1,512,642	2,579,705	241,630
1914	182,000,000	14,766,416	997,575	4,554,549	309,511
1915	256,000,000	24,845,414	1,718,547	2,808,806	238,958

NOTE.—Imported raisins come almost entirely from Spain, and sultanas, which are included in the above figures from Smyrna in Turkey in Asia. These latter have also greatly decreased in recent years from upward of 7,000,000 pounds in 1906 to about 500,000 pounds, but in 1913 the quantity increased to 1,287,296 pounds, and 2,730,338 pounds in 1914. Canada is our best customer for raisins, taking 18,000,000 pounds in 1913 and 10,000,000 in 1914.

DRIED GRAPES.

The quantity of "dried grapes" (which are wine grapes) is now small, and is discouraged as they make inferior raisins.

IMPORTS OF GREEK CURRANTS, 1891-1915.

(Duty, 1½ cents per pound.)

Year	Pounds	Value
1891*	33,128,140	$1,246,074
1892*	36,665,828	1,209,119
1893*	33,166,546	1,185,537
1894*	52,664,843	774,802
1895*	16,450,706	258,659
1896*	33,040,846	551,072
1897	29,265,761	596,084
1898	25,186,210	837,987
1899	30,849,253	798,357
1900	36,251,779	916,908
1901	16,049,198	916,994
1902	36,238,976	1,238,756
1903	33,878,209	743,644
1904	38,347,649	997,430
1905	31,742,919	764,289
1906	37,078,311	1,119,146
1907	38,392,779	1,746,941
1908	38,652,656	1,592,018
1909	32,482,111	1,185,106
1910	33,326,030	1,190,020
1911	33,439,565	1,486,263
1912	33,151,396	1,561,350
1913	30,843,735	1,306,410
1914	32,033,177	1,233,228
1915	30,350,527	1,209,273

*From 1891 to 1894, currants were duty free, and in 1895, 1896 and 1897, currants not from Zante were admitted free. Currants practically all come from Greece.

CALIFORNIA CANNED FRUIT, AND EXPORTS, 1891-1915.

(None imported.)

Year	California pack, cases	Exports, value
1891	1,571,200	$703,880
1892	1,602,370	1,558,820
1893	1,001,640	1,137,660
1894	1,528,815	660,723
1895	1,639,807	871,465
1896	1,602,446	1,376,281
1897	1,942,982	1,686,723
1898	2,085,166	1,624,741
1899	3,003,100	2,330,715
1900	2,775,800	3,127,278
1901	2,677,000	3,006,109
1902	2,252,000	1,195,635
1903	2,783,500	1,739,571
1904	2,840,600	2,637,002
1905	3,252,500	2,541,025
1906	3,125,000	2,348,064
1907	2,983,000	1,581,047
1908	4,734,000	1,549,826
1909	3,047,000	2,899,374
1910	3,600,000	2,656,019
1911	4,095,035	2,686,445
1912	5,005,950	4,012,463
1913	4,015,500	5,599,373
1914	6,126,069	4,863,946
1915	5,357,100	6,064,765

*Exported domestic canned fruit in 1914, to the United Kingdom, $3,182,051; to all other countries, $1,681,895.

IMPORTS OF MISCELLANEOUS FRUITS, 1891-1915.

Duty on Imported Preserved Fruits.

Preserved in sugar of their own juices, 1 cent a pound; if contained over 10 per cent of alcohol, 20 per cent ad valorem and in addition $2.50 per proof gallon of alcohol in excess of 10 per cent. Jellies, 20 per cent ad valorem; pineapples preserved in their own juice, 20 per cent ad valorem.

Year	Prepared or preserved fruits, value	All other fresh or dried fruits, value	Total fruits, value
1891	$1,289,137	$2,552,245	$23,018,937
1892	1,234,828	2,508,940	18,176,471
1893	864,166	3,372,666	20,944,918
1894	526.561	2,980,584	16,566,782
1895	570,568	1,725,342	15,227,079
1896	598,928	2,128,056	16,957,307
1897	605,053	1,810,807	14,926,771
1898	922,357	1,294,855	12,329,012
1899	1,020,644	1,579,652	15,586,664
1900	1,243.479	1,989,546	16,284,758
1901	1,366,801	2,059.130	16,317,848
1902	1,454,788	2,053,588	17,436,184
1903	1,521.443	2.353.864	18,860,238
1904	1,796.209	2,749,670	18,964,688
1905	1,599,488	2,924,187	19,779,113
1906	2,437,766	2,484,345	21,542,322
1907	1,272,445	1,263,167	26,124,277
1908	1,550,246	2,250,815	27,710,799
1909	1,062,775	1,912,949	22,446,430
1910	956,368	920,362	24.177,160
1911	893,633	971.572	27.017,632
1912	936,008	1,693,516	29.549.281
1913	795,399	1,115,330	28,657,084
1914	1,111,193	1,710,009	2,821,202
1915	1,022,968	1,431,242	2,454,210

EXPORTS OF DOMESTIC FRUITS, 1891-1915.

Year	Preserved other than canned	Other fresh or dried fruits	Total fruits
1891	$93,996	$699,798	$2,384,176
1892	214,738	1,095,845	6,565,461
1893	224,381	881,804	3,823,897
1894	211,215	1,016,397	2,299,006
1895	47,420	1,522,100	4,856,517
1896	70,353	1,868,353	5,585,783
1897	43,276	2,172,199	7,613,500
1898	82,504	2,033,845	8,851,787
1899	66,899	1,997,649	7,757,235
1900	63,448	2,545,451	11,486,172
1901	71,597	2,716,269	10,607,908
1902	94,323	2,153,050	8,415,103
1903	66,757	4,215,034	17,558,119
1904	115,490	4,317,910	20.348,299
1905	71,868	2,253,638	15,297,391
1906	89,872	1,727,943	14,857,272
1907	104,663	2,246,384	17,206.267
1908	137,929	2,360,360	13,965,840
1909	77,746	2,104,624	16,079,227
1910	176,474	2,119,210	18,504,591
1911	205,643	2,792,281	23.893,663
1912	136,870	3,812,304	30,354,700
1913	181,749	2,893,395	36,345,517
1914	224,841	2,922,740	3,147,581
1915	269,180	2,717,449	2,986,629

ALMONDS, 1891-1915.

(Duty, 3 cents per pound; shelled, 4 cents per pound.)

Year	California crop, pounds	Imported	
		Pounds	Value
1891	500,000	6,812,061	$931,007
1892	1,066,000	7,629,392	1,028,671
1893	720,000	6,679,147	938,054
1894	2,125,000	7,436,784	769,453
1895	1,850,000	7,903,375	810,439
1896	3,210,000	7,789,681	763,594
1897	4,750,000	9,644,338	880,263
1898	900.000	5,746,362	659,659
1899	4,640,000	9.957,427	1,222,587
1900	5,480.000	6,317,633	949,083
1901	3,000,000	5,140.232	946,138
1902	6,540,000	9,868,982	1,240,886
1903	6,400,000	8,142,164	1,337,717
1904	1,600,000	9,838,852	1,246,474
1905	4,250,000	11,745.081	1,520,063
1906	1,800,000	15,009,326	1,825,475
1907	1,850,000	14,233,613	2,331,816
1908	6,000,000	17,144,968	2,410,648
1909	3,500,000	11,029,421	1,852,523
1910	6,800,000	18,556,356	3,153,645
1911	3,400,000	15,552,712	2,896,573
1912	6,000,000	17,231,458	3,253,495
1913	2,200,000	15,670,558	3,344,658
1914	5,000,000	19,038,405	4,679,289
1915	7,000,000	17,111,264	3,599,579

*Of the above quantity imported in 1914, 13,307,631 pounds were shelled and 5,730,774 pounds unshelled, and in 1915 12,208,551 shelled and 4,902,713 were not shelled.

Practically all almonds are imported from Spain, Italy and France.

WALNUTS, 1891-1915.

(Duty on imported walnuts, unshelled, 2 cents per pound; shelled, 4 cents.)

Year	California crop, pounds	Imported	
		Pounds	Value
1891	2,124,000		
1892	2,950,000		
1893	2,866,000		
1894	5,805,000		
1895	4,620,000		
1896	8,230,000		
1897	7,970,000		
1898	11,300,000		
1899	11,160,000		
1900	10,860,000		
1901	13,800,000		
1902	17,140,000		
1903	11,000,000	12,362,567	$1,106,033
1904	15,180,000	23,670,761	1,729,378
1905	11,500,000	21,684.104	1,469,463
1906	12,250,000	24,917,028	2,193,653
1907	14,000,000	32,597,592	2.969,649
1908	18,000,000	28.887,110	2,765,486
1909	17.000.000	26,157,703	2,409,644
1910	15,000,000	33,641,466	3,538,264
1911	22,000,000	33,619,434	4,471.227
1912	19,500,000	37,213,674	4,069,515
1913	22,378,354	26,662,441	3,499,981
1914	17,780,000	37,195,728	4,339,481
1915	28,600,000	33,445,838	3,984.227

Years for which no figures are given are included in "Other nuts."

*Of the above number imported in 1914, 28,267,699 pounds were unshelled, and 8,928,029 shelled, and in 1915 22,338,348 pounds unshelled, and 11,107,490 pounds shelled.

IMPORTED NUTS, 1891-1915.

(Duty on imported peanuts, unshelled, ⅜ of 1 per cent per pound; shelled, ¾ of 1 per cent per pound; all others (except almonds, peanuts and walnuts) 1 cent per pound.)

Year	Peanuts and other ground nuts		Miscellaneous nuts, value	Total all nuts, crop*
	Pounds	Value		
1891			$1,115,978	$2,997,456
1892			822,255	2,792,846
1893			951,941	2,744,741
1894			631,759	2.187,989
1895			730,411	2,012,844
1896			868,799	2,075,132
1897			848,511	2,200,161
1898			1,002,344	2,237,938
1899			879,166	2,727,542
1900			1,326,804	2.978.834
1901			1,518.484	3.268,855
1902			1,971,072	4,044,341
1903			1,514,406	4,866,398
1904			1,523,462	5,471,166
1905			2,082.344	6,158,343
1906			2,055,557	7,373,425
1907			2,100,274	9,742,883
1908			1,790.375	9.643,943
1909			1,717,374	8,664,253
1910	29,276,235	$1,234,088	1,218,052	13,246,742
1911	18,834,441	765,033	1,254,943	14,498,413
1912	15,558,038	575,282	858,837	15.827,988
1913	18,756,422	769,666	977,161	13.965,569
1914	44,549,789	1,899,237	1,357,520	19.782,924
1915	24,184,673	824,759	884,850	16,819,799

In 1913 the unshelled peanuts imported amounted to 12,281,580 pounds, and the shelled to 6,474,842 pounds, and in 1914 the unshelled 17,472,631, and the shelled 27,077,158.

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*Including cocoanuts, cream and Brazil nuts, and filberts.

EXPORTS OF DOMESTIC NUTS, 1891-1915.

Year	Peanuts		Other nuts, value	Total nuts, value
	Pounds	Value		
1891				$50,617
1892				60,684
1893				94,902
1894				125,233
1895				115,274
1896				93,283
1897				125,805
1898				161,432
1899				140,250
1900				156,490
1901				218,743
1902				304,241
1903				299,558
1904				330,366
1905				309,195
1906*	7,180,163	$275,927	$140,959	416,886
1907	6,386,012	278,236	103,929	382,165
1908	5,503,685	283,819	89,205	373,024
1909	5,501,107	242,569	246,284	488,853
1910	4,484,613	224,779	156,284	381,063
1911	5,447,185	276,651	328,151	604,802
1912	5,920,711	305,465	303,473	608,938
1913	7,301,381	366,016	367,569	733,585
1914	8,054,817	421,367	398,312	819,679
1915	5,875,076	325,725	377,486	703,211

*Prior to 1906 peanuts were not shown separately in the customs returns.

TABLE XXIX.

ORCHARD FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.

Counties	Apples		Apricots		Cherries	
	Number of trees	Bushels	Number of trees	Bushels	Number of trees	Bushels
Alameda	26,045	38,346	270,461	399,035	89,284	89,662
Alpine	1,140	642	7	----------	63	2
Amador	8,592	11,990	1,197	949	1,143	1,588
Butte	34,425	42,671	9,900	11,126	4,317	4,403
Calaveras	13,341	21,583	672	465	459	329
Colusa	3,067	4,507	4,420	3,323	223	228
Contra Costa	13,429	18,494	38,812	19,906	7,258	5,139
Del Norte	3,234	3,110	----------	----------	48	38
El Dorado	31,929	26,529	503	786	3,259	3,051
Fresno	32,097	34,505	186,823	206,536	2,729	104
Glenn	4,617	4,909	6,830	2,310	78	48
Humboldt	73,010	1,552,585	235	267	3,733	5,040
Imperial	86	3	1,922	673	----------	----------
Inyo	19,611	35,430	342	416	539	331
Kern	7,725	10,006	33,573	48,955	163	64
Kings	4,196	8,507	124,007	234,147	11	205
Lake	22,254	18,537	1,463	536	590	764
Lassen	12,679	10,349	70	17	439	61
Los Angeles	101,433	118,528	122,769	181,079	795	168
Madera	20,576	11,227	9,408	6,188	40	20
Marin	15,995	6,907	1,689	633	165	111
Mariposa	16,001	29,141	233	415	120	216
Mendocino	63,263	112,856	187	305	1,181	1,576
Merced	8,941	7,267	7,381	4,263	343	64
Modoc	28,969	60,202	652	788	963	1,033
Mono	1,088	850	6	1	197	190
Monterey	290,404	501,847	27,996	36,067	1,729	723
Napa	41,301	47,216	16,953	16,273	16,955	20,895
Nevada	20,223	25,800	193	133	1,727	1,810
Orange	11,992	12,218	129,352	328,931	23	9
Placer	42,704	26,848	4,092	1,023	31,209	67,429
Plumas	3,534	1,391	18	----------	65	10
Riverside	10,577	9,977	83,069	145,159	982	765
Sacramento	10,948	18,235	10,480	9,951	17,173	33,729
San Benito	26,593	31,385	61,694	106,806	3,421	1,761
San Bernardino	55,150	79,077	111,125	171,763	3,057	2,928
San Diego	37,662	45,687	20,858	33,001	1,792	1,729
San Francisco	40	230	----------	----------	----------	----------
San Joaquin	5,053	7,019	53,007	27,474	21,590	13,669
San Luis Obispo	35.006	56,047	20,123	25,929	702	463
San Mateo	18,634	31,317	3,694	1,259	671	228
Santa Barbara	2,744	38,511	15,512	29,237	659	238
Santa Clara	102,841	118,603	783,585	958,163	173,002	90,198
Santa Cruz	647,136	2,090,968	63,021	95,042	17,608	25,368
Shasta	35,440	47,556	839	2,141	2,785	2,311
Sierra	3,398	4,895	----------	----------	67	114
Siskiyou	31,055	19,521	366	363	1,850	1,478
Solano	4,862	6,857	310,262	180,011	53,923	52,512
Sonoma	386,740	818,725	9,087	10,374	43,927	58,710
Stanislaus	3,680	1,693	20,451	14,122	1,182	380
Sutter	5,433	7,806	5.986	3,443	1,249	967
Tehama	15,633	16,256	30,446	26,128	624	321
Trinity	4,272	4,951	41	33	247	205
Tulare	25,261	28,241	48,834	56,042	316	290
Tuolumne	13,544	16,558	162	120	144	118
Ventura	15,179	19,170	219,836	562,978	392	1,047
Yolo	2,512	3,654	117,228	101,396	4,534	5,908
Yuba	5,468	7,133	1,481	342	559	265
Totals	2,482,762	6,335,073	2,992,453	4,066,823	522,304	501,013

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*For the number of bearing trees in orchard fruits in 1890 and 1900, see Report for 1912, pages 162–164.

TABLE XXIX—Continued.

ORCHARD FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.

Counties	Peaches and nectarines		Pears	
	Number of trees	Bushels	Number of trees	Bushels
Alameda	12,555	14,561	70,382	99,994
Alpine	28	40	79	36
Amador	16,349	20,606	5,112	4,430
Butte	255,047	356,683	22,159	25,318
Calaveras	5,954	6,794	2,178	5,358
Colusa	4,075	3,372	2,432	1,906
Contra Costa	39,461	38,525	68,088	75,803
Del Norte	42	32	129	154
El Dorado	61,800	58,738	49,672	36,848
Fresno	2,277,314	2,727,978	13,356	7,548
Glenn	6,420	3,175	1,655	1,500
Humboldt	9,471	10,552	3,804	8,196
Imperial	432	228	347	11
Inyo	4,602	5,037	2,668	2,676
Kern	35,149	30,278	1,057	1,065
Kings	777,697	803,637	4,379	8,007
Lake	9,288	8,336	39,075	39,871
Lassen	1,455	1,753	632	479
Los Angeles	160,197	234,581	16,149	21,161
Madera	40,989	20,996	1,185	1,164
Marin	6,313	3,092	4,151	8,979
Mariposa	1,618	1,803	701	1,528
Mendocino	6,928	10,031	15,829	23,666
Merced	134,991	90,954	5,704	2,624
Modoc	2,113	1,866	1,888	3,334
Mono	91	61	123	122
Monterey	7,381	8,693	5,194	8,061
Napa	71,080	65,843	50,210	81,812
Nevada	17,873	22,488	36,800	26,279
Orange	12,461	13,104	2,100	2,973
Placer	683,824	1,084,566	142,999	115,950
Plumas	184	35	261	112
Riverside	72,933	77,138	18,447	13,424
Sacramento	99,635	129,981	161,094	308,352
San Benito	12,301	25,132	12,409	22,903
San Bernardino	197,763	246,049	2,302	3,421
San Diego	29,800	29,530	6,023	7,585
San Francisco	120	125	----------	----------
San Joaquin	185,073	229,175	13,664	13,096
San Luis Obispo	10,614	10,325	5,097	8,869
San Mateo	572	643	1,688	1,923
Santa Barbara	9,560	11,337	2,612	5,148
Santa Clara	437,677	574,514	142,550	206,214
Santa Cruz	11,868	10,873	23,100	33,456
Shasta	98,950	110,712	33,952	64,803
Sierra	157	83	148	414
Siskiyou	4,371	3,779	2,300	2,164
Solano	341,266	474,444	182,194	319,303
Sonoma	237,220	165,396	109,965	128,421
Stanislaus	154,553	89,385	4,158	1,804
Sutter	149,057	287,894	17,911	32,754
Tehama	260,204	276,049	141,584	26,992
Trinity	886	873	738	1,468
Tulare	714,494	622,373	6,483	4,948
Tuolumne	3,065	2,063	1,056	2,004
Ventura	8,943	15,630	2,597	3,776
Yolo	116,003	219,660	38,115	71,897
Yuba	8,744	5,517	10,220	25,993
Totals	7,829,011	9,267,118	1,410,905	1,928,097

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*For the number of bearing trees in orchard fruits in 1899 and 1900, see Report for 1912, pages 162–164.

TABLE XXIX—Continued.

ORCHARD FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.

Counties	Plums and prunes		Total	
	Number of trees	Bushels	Number of trees	Bushels
Alameda	157,981	157,270	627,824	799,976
Alpine	214	42	1,531	762
Amador	10,685	11,880	43,332	51,757
Butte	104,474	252,141	452,302	693,210
Calaveras	8,265	9,901	31,276	44,963
Colusa	57,468	111,658	71,796	125,122
Contra Costa	58,177	54,831	225,939	213,351
Del Norte	96	222	3,549	3,556
El Dorado	32,764	23,327	180,017	149,543
Fresno	66,926	139,252	2,579,859	3,116,325
Glenn	24,860	8,559	44,565	20,613
Humboldt	26,950	12,161	117,368	1,589,053
Imperial	347	3	3,170	926
Inyo	2,349	1,845	30,164	45,760
Kern	58,075	74,053	136,088	164,626
Kings	132,192	258,851	1,048,506	1,315,117
Lake	47,244	54,807	120,037	122,945
Lassen	2,223	1,069	17,511	13,731
Los Angeles	43,592	34,295	446,698	590,929
Madera	7,570	435	80,156	40,077
Marin	3,775	2,625	32,263	22,420
Mariposa	762	1,168	19,461	34,283
Mendocino	37,197	63,356	125,282	212,320
Merced	5,401	3,437	163,013	108,843
Modoc	3,182	4,660	37,776	71,883
Mono	86	10	1,595	1,234
Monterey	6,189	4,122	339,105	559,680
Napa	299,613	407,023	497,391	639,976
Nevada	6,955	7,055	84,259	84,046
Orange	4,569	5,295	160,667	362,981
Placer	279,766	323,731	1,190,074	1,673,123
Plumas	510	161	4,574	1,709
Riverside	34,357	54,873	220,723	301,493
Sacramento	206,553	269,547	506,961	772,257
San Benito	91,066	223,443	207,537	411,477
San Bernardino	8,779	6,473	379,533	509,989
San Diego	16,022	8,204	112,993	126,427
San Francisco	945	575	1,105	930
San Joaquin	83,641	102,991	364,290	395,038
San Luis Obispo	21,383	15,236	93,217	117,126
San Mateo	18,279	14,686	43,655	50,130
Santa Barbara	2,730	4,822	34,200	89,858
Santa Clara	3,387,455	3,854,070	5,043,766	5,807,595
Santa Cruz	112,269	109,959	875,642	2,366,244
Shasta	87,959	159,696	262,136	387,566
Sierra	232	262	4,002	5,768
Siskiyou	5,683	4,405	45,708	31,735
Solano	465,341	714,730	1,357,911	1,747,916
Sonoma	569,232	596,953	1,364,105	1,784,301
Stanislaus	6,095	3,492	190,515	111,304
Sutter	65,723	136,082	244,587	469,829
Tehama	92,459	133,024	441,070	478,915
Trinity	1,083	1,329	7,313	8,906
Tulare	264,337	639,586	1,059,830	1,351,573
Tuolumne	1,404	1,302	19,554	22,254
Ventura	12,541	15,755	259,682	618,490
Yolo	119,193	214,792	397,748	617,448
Yuba	3,487	2,447	30,264	41,998
Totals	7,168,705	9,317,979	22,485,195	31,501,507

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*For the number of bearing trees in orchard fruits in 1890 and 1900, see Report for 1912, pages 162–164.

TROPICAL FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.

Counties	Figs		Olives		Lemons	
	Number of trees	Pounds	Number of trees	Pounds	Number of trees	Boxes
Alameda	482	9,990	10,963	45,285	660	2,144
Alpine	----	----	4	50	----	----
Amador	347	24,315	274	2,600	8	12
Butte	9,518	337,725	73,453	2,242,445	2,223	1,222
Calaveras	1,839	142,990	4,065	10,465	19	37
Colusa	1,391	60,577	336	5,716	199	148
Contra Costa	293	16,235	9,744	340,410	148	92
Del Norte	1	----	----	----	----	----
El Dorado	587	74,060	37	4,020	----	----
Fresno	120,124	15,898,146	72,788	655,302	12,389	10,083
Glenn	879	63,235	445	14,290	593	432
Humboldt	82	2,430	----	----	----	----
Imperial	606	10,450	41	----	36	4
Inyo	14	400	----	----	----	----
Kern	1,475	92,990	393	2,950	54	37
Kings	391	26,720	5	400	----	----
Lake	1,062	41,896	3,198	7,390	8	----
Lassen	----	----	----	----	----	----
Los Angeles	5,736	397,376	84,934	1,549,419	219,149	704,301
Madera	4,321	82,290	18,010	38,035	15	16
Marin	201	1,065	48	150	26	25
Mariposa	461	135,455	2,711	2,452	35	50
Mendocino	358	25,125	7	100	----	----
Merced	9,837	793,495	6,981	90,916	209	217
Modoc	----	----	----	----	----	----
Mono	----	----	----	----	----	----
Monterey	217	9,146	657	2,622	7	----
Napa	1,234	20,889	20,176	36,885	258	86
Nevada	1,468	67,225	419	4,273	6	----
Orange	1,066	25,123	67,046	828,204	46,954	74,227
Placer	4,463	105,802	26,396	417,415	714	683
Plumas	6	----	6	----	----	----
Riverside	2,054	73,796	80,572	1,281,970	115,020	304,683
Sacramento	1,145	54,450	34,077	969,962	2,500	1,636
San Benito	128	4,615	4	----	5	4
San Bernardino	1,144	33,790	30,190	486,478	157,731	630,108
San Diego	2,459	94,323	109,871	2,559,792	195,318	473,543
San Francisco	----	----	1	----	----	----
San Joaquin	4,037	232,063	19,998	506,268	75	58
San Luis Obispo	819	43,317	1,597	28,877	955	1,475
San Mateo	36	525	7,187	141,006	1	1
Santa Barbara	858	40,255	44,258	1,275,022	46,181	134,168
Santa Clara	985	31,500	13,945	639,227	996	1,201
Santa Cruz	333	12,845	1,243	2,500	349	233
Shasta	2,306	53,270	9,616	7,541	7	1
Sierra	----	----	----	----	----	----
Siskiyou	3	10	----	----	2	----
Solano	4,598	497,159	1,221	34,874	126	163
Sonoma	3,850	98,105	10,863	54,490	396	235
Stanislaus	37,676	397,675	5,458	129,384	576	262
Sutter	4,675	447,470	3,018	170,581	602	641
Tehama	3,176	115,472	17,373	394,449	356	354
Trinity	20	255	----	----	2	----
Tulare	15,750	1,037,350	5,605	89,921	41,069	65,466
Tuolumne	237	17,435	10	----	6	----
Ventura	618	29,653	25,961	686,171	95,018	347,804
Yolo	10,476	1,128,670	4,482	307,395	183	222
Yuba	3,159	81,200	6,660	64,710	109	147
Totals	269,001	22,990,353	836,347	16,132,412	941,293	2,756,221

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*For the number of bearing trees of tropical fruits in 1890 and 1900, see Report for 1912, pages 165–167.

NOTE.—The production being in pounds and citrus fruits in boxes, the total production for each county can not be given.

TABLE XXX—Continued.

TROPICAL FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.

Counties	Oranges		Pomelos		Total trees
	Number of trees	Boxes	Number of trees	Boxes	
Alameda	3,782	6,074	4	2	15,900
Alpine					4
Amador	151	283			780
Butte	147,412	128,108	122	171	235,442
Calaveras	388	544	3	2	6,315
Colusa	1,537	2,970	70	147	3,537
Contra Costa	402	453			10,597
Del Norte					1
El Dorado	53	195			677
Fresno	85,781	92,640	346	431	291,754
Glenn	4,860	1,704	5	13	6,783
Humboldt	1				83
Imperial	1,410	3,012	18	1	2,411
Inyo					14
Kern	80,940	32,232	16	7	82,888
Kings	24	31			425
Lake	72	13			4,340
Lassen					
Los Angeles	1,674,695	4,124,161	6,853	11,810	1,994,402
Madera	184	114	2		22,532
Marin	79	147	5	9	387
Mariposa	1,169	1,691	1	1	4,378
Mendocino	4	3			370
Merced	1,572	1,097	11	2	18,613
Modoc					
Mono					
Monterey	29	25			913
Napa	1,192	535	9	21	23.251
Nevada	364	320	2		2,311
Orange	478,272	1,247,905	677	2,612	597.383
Placer	26,921	14,103	289	411	59,906
Plumas					12
Riverside	1,021,957	2,006,902	4,477	16,408	1,224,217
Sacramento	46,256	61,517	864	1,278	84,863
San Benito	42	10			179
San Bernardino	1,951,254	5.425,759	13,134	60,149	2,153,501
San Diego	107,457	167,201	5,764	12,950	425,260
San Francisco					1
San Joaquin	1,950	1,854	2		26 070
San Luis Obispo	794	1,225	75	49	4,253
San Mateo	25	9			7,249
Santa Barbara	4,246	12,272	716	931	99,023
Santa Clara	1,905	1,354	57	9	18,023
Santa Cruz	330	151	7	6	2,279
Shasta	55	39			11,986
Sierra					
Siskiyou					6
Solano	2,950	2,737	15		8,911
Sonoma	5,047	4,209	8	4	20,226
Stanislaus	10,492	8,087	18	1	54,291
Sutter	2.427	3,335	18	14	10,741
Tehama	10,744	7,975	5	4	31,654
Trinity					22
Tulare	801,151	758,465	8,114	13,551	872,657
Tuolumne	114	122			367
Ventura	131.681	310,239	392	909	253,754
Yolo	2,371	2,949	1,325	612	18,858
Yuba	1,263	1,409			11.205
Totals	6,615,805	14,436,180	43,424	122,515	8,726.005

NOTE.—The production being in pounds and citrus fruits in boxes, the total production for each county can not be given.

TABLE XXXI.

GRAPES AND NUTS BY COUNTIES.*

Number of Vines and Bearing Trees in 1910, and Production.

Counties	Grapes		Almonds		Pecans		Walnuts		Total nuts	
	Number of vines bearing	Production, pounds	Number of trees	Pounds	Number of trees	Pounds	Number of trees	Pounds	Number of trees	Pounds
Alameda	2,390,959	20,671,600	21,190	155,871	5	80	3,726	46,183	25,250	210,142
Alpine	9,000	56,000	12	75					12	75
Amador	314,604	2,743,320	628	3,931	1	50	185	3,266	830	7,602
Butte	258,742	1,499.000	84,069	799,351	158	5,450	1,063	22,906	85,445	832,019
Calaveras	212,300	1,457,030	14,624	27,080	6		832	22,117	15,619	51,932
Colusa	482,417	5,010,240	16,078	90,479	10	340	1.306	13,463	17,409	105,782
Contra Costa	2,972,130	32,217,131	209,056	830,112	25	200	6,148	110,088	215,249	941,400
Del Norte					3		3		6	
El Dorado	581,342	4,891,740	438	3,850			880	10,855	1,512	27,130
Fresno	40,687,207	611,253,961	7,390	56,472	56	225	634	7,991	8,203	70,097
Glenn	20,416	145,300	25,739	61,055	15	350	220	3,617	26,336	67,707
Humboldt	4,095	76,405	304	580			498	8,220	827	8,975
Imperial	298.813	1,210,475	29				24	400	53	400
Inyo	39,478	292,730	28	1,080	9	150	35	940	72	2,170
Kern	419,582	1,715,540	3,101	23,505	563	1,290	127	1,565	3,819	26,615
Kings	4,538,732	91,434,166	1,721	37,040	2	40	24	1,215	1,747	38,295
Lake	296,752	1,750,522	8,281	47,316	6	350	564	5,232	8,920	55,198
Lassen	31	800	8				8	250	16	250
Los Angeles	4,923,877	44,846,307	76,949	57,770	313	6,400	281,837	6,138,033	359,349	6,204,703
Madera	1,530,630	21,105,970	2,778	7,975	5		14	560	2,797	8,535
Marin	115,198	1,982,560	151	1,112			61	385	212	1,497
Mariposa	28,647	285,740	159	1,918			91	2,019	262	4,270
Mendocino	924,191	6,471,050	229	4,260			360	9,990	762	33,040
Merced	1,281,342	12,085,751	17,132	114,499	31	200	633	11,538	17,845	127,357
Modoc	795	7,100					3	80	27	535
Mono	2,000	20,000								
Monterey	79,935	754,340	2,196	24,050	3	100	306	3,287	2,505	27,437
Napa	8,595,338	66,876,897	18,731	90,783	996		7,767	44.164	27,622	135,747
Nevada	94,338	757,865	1,325	11,980	10	40	1,105	13,811	2,768	32,048
Orange	282,682	2,684,855	1,248	70	26	1,350	276,842	7,478,955	278,879	7,492,175
Placer	1,340,132	11,231,830	11,539	64,431	2		535	3,276	12,122	69,065
Plumas							4		4	

Riverside	1,570,794	12,133,389	21,789	168,570	98	3,520	3,040	67,491	24,940	239,581
Sacramento	7,627,510	399,386,705	66,372	335,257	3	100	755	21,682	67,156	357,539
San Benito	177,976	1,620,030	6,958	73,922	6	100	1,369	29,800	8,333	103,822
San Bernardino	5,987,127	38,608,263	634	15,479	------	------	2,228	43,777	2,900	60,742
San Diego	1,228,858	15,204,430	9,279	40,521	1,080	19,205	9,159	194,829	19,651	259,730
San Francisco	3,000	10,000	------	------	------	------	------	------	------	------
San Joaquin	13,371,794	175,879,915	97,024	547,300	6	250	2,455	6,548	99,499	554,098
San Luis Obispo	265,481	1,937,110	9,281	46,990	1	------	7,871	223,493	17,264	277,783
San Mateo	124,990	695,440	94	425	------	------	223	2,010	331	2,435
Santa Barbara	208,595	590,485	239	3,150	70	130	96,776	2,678,039	97,091	2,681,694
Santa Clara	5,584,480	41,129,250	25,862	198,186	136	1,000	19,070	227,955	48,398	469,926
Santa Cruz	1,365,414	7,315,935	240	1,855	5	------	4,015	25,880	4,757	40,640
Shasta	117,481	643,463	8,056	43,210	7	100	1,168	14,380	9,339	64,760
Sierra	------	------	------	------	------	------	24	1,260	24	1,260
Siskiyou	2,473	44,507	83	2,611	2	------	30	275	185	5,046
Solano	1,213,265	16,276,990	98,276	650,933	134	2,175	1,806	27,636	100,239	681,194
Sonoma	17,939,972	137,556,285	2,893	11,279	43	220	11,955	144,040	16,631	168,151
Stanislaus	1,932,302	18,595,445	33,726	118,198	25	760	864	10,995	34,701	134,103
Sutter	1,249,923	25,162,300	61,572	343,084	11	------	671	7,130	62,289	350,214
Tehama	1,307,218	16,416,690	32,919	219,396	10	------	1,569	13,500	34,555	237,596
Trinity	2,842	57,950	30	5	1	------	58	1,510	91	1,560
Tulare	7,227,491	95,037,424	1,977	59,822	26	505	1,942	28,612	3,945	88,939
Tuolumne	95,811	580,502	54	200	1	------	175	6.465	240	6,840
Ventura	36,398	505,892	12,057	166,180	301	------	98,622	3,665.935	110,984	3,832,116
Yolo	2,568,019	26,109,390	149,019	1,109,760	9	245	1,270	19.953	150,822	1,151,868
Yuba	162.751	2,652,510	3,163	19,535	6	30	287	4,665	3,458	24,280
Totals	144,097,670	1,979,686,525	1,166,730	6,692,513	4.226	44,955	853,237	21,432.266	2,034,302	28,378,115

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*For the number of grapevines and bearing trees in nuts in 1890 and 1900, see Report of 1912, pages 167--169.

TABLE XXXII.

SMALL FRUITS BY COUNTIES.

Number of Acres in 1910, and Production.

Counties	Strawberries		Blackberries and dewberries		Total*	
	Acres	Quarts	Acres	Quarts	Acres	Quarts
Alameda	18	41,770	12	20,225	401	890,867
Alpine	----------	----------	----------	----------	----------	1,510
Amador	6	9,259	13	18,655	29	46,124
Butte	48	54,513	57	76,793	148	207,794
Calaveras	5	11,210	14	13,366	34	37,948
Colusa	1	2,120	5	7,039	7	12,564
Contra Costa	1	2,880	3	2,774	6	13,654
Del Norte	1	1,050	----------	300	1	1,760
El Dorado	5	8,215	11	12,480	23	31,427
Fresno	148	750,708	91	247,186	310	1,196,643
Glenn	2	2,945	4	8,980	8	15,005
Humboldt	58	152,758	4	5,757	87	219,489
Imperial	----------	----------	1	1,426	1	1,726
Inyo	5	5,591	8	9,835	21	18,621
Kern	2	2,112	26	24,900	34	32,087
Kings	15	53,810	13	33,260	31	94,940
Lake	6	12,227	15	15,261	25	33,910
Lassen	3	3,380	2	2,354	20	14,889
Los Angeles	1,380	5,135,203	280	1,019,735	1,975	7,837,987
Madera	2	1,750	3	1,380	7	4,270
Marin	1	1,750	----------	380	3	5,130
Mariposa	1	1,217	2	4,470	7	8,705
Mendocino	22	35,296	14	11,900	57	69,492
Merced	5	8,377	21	25,230	34	47,293
Modoc	9	10,113	9	11,515	37	44,168
Mono	----------	1,220	----------	48	1	5,011
Monterey	263	2,449,084	56	268,180	407	3,663,576
Napa	22	45,316	26	18,903	59	72,503
Nevada	4	7,047	15	29,245	55	78,369
Orange	76	192,365	43	71,907	205	401,218
Placer	433	1,062,214	62	198,039	582	1,581,263
Plumas	6	6,828	1	584	13	11,881
Riverside	27	59,305	28	49,554	64	123,772
Sacramento	450	1,676,826	52	143,729	554	1,974,178
San Benito	35	34,367	1	4,310	54	68,426
San Bernardino	34	52,917	68	112,255	130	190,564
San Diego	43	275,744	22	45,635	87	369,546
San Francisco	----------	----------	----------	----------	----------	----------
San Joaquin	33	93,367	31	51,650	92	226,154
San Luis Obispo	45	61,895	30	42,845	137	131,117
San Mateo	56	210,850	10	15,030	69	232,655
Santa Barbara	24	125,766	32	99,084	63	233,123
Santa Clara	460	989,600	228	304,022	1,011	1,785,865
Santa Cruz	489	1,384,784	116	163,757	744	1,707,208
Shasta	44	51,975	32	35,067	95	112,667
Sierra	2	2,623	1	964	6	5,997
Siskiyou	7	15,011	10	11,057	31	41,053
Solano	5	11,060	5	5,560	12	19,110
Sonoma	103	195,330	930	1,413,936	1,471	2,106,103
Stanislaus	95	184,399	53	84,073	161	290,431
Sutter	1	1,550	7	8,008	16	24,186
Tehama	36	57,921	7	11,163	49	83,593
Trinity	5	4,668	5	4,307	15	14,039
Tulare	19	44,078	70	87,262	119	181,574
Tuolumne	5	10,652	8	9,729	19	29,153
Ventura	14	72,350	7	18,566	31	138,600
Yolo	1	210	6	6,162	10	10,774
Yuba	4	4,750	6	8,692	19	22,408
Totals	4,585	15,694,326	2,576	4,898,524	9,687	26,824,120

*The totals include other fruits not specified. See also pages 120 and 124-25.

PART V.

CALIFORNIA WINE INDUSTRY

Sweet Wines and Brandy in Other States, California Vineyards, Sparkling Wines, Grape Juice, Price of Wine Grapes, Vintages 1891-1914, Imports and Exports of Wine and Brandy, California Brandies.

The California wine industry, with its extensive vineyards of wine grapes and enormous investments of capital, has attained such proportions as to demand special notice. In sweet wines the production has more than doubled within the last ten years, and the output, both in wine and brandy, is much greater than that of all other states combined.*

The State Board of Viticultural Commissioners estimates that more than half the acreage of vineyards in the State is planted to wine grapes, the area being about 170,000 acres.

Wine and Brandy.

Almost all the sweet wine and brandy produced in the United States is made in California. New York and New Jersey make small quantities of port and sweet catawaba, North Carolina and Virginia scuppernong, and Ohio appears as a maker of sweet wines in 1915 for the first time in ten years, with 6,863 gallons of scuppernong. Missouri also made a small quantity of sweet wine some ten years ago, but only about 1,500 gallons. The total production of sweet wine in the United States in 1915 was 17,168,698 gallons, of which quantity California supplied 16,868,374 gallons, and all other states 300,324 gallons. Of fruit brandy California produced 7,906,380 gallons, and all other states 615,571 gallons, or a total of 8,521,951 gallons in the United States.

Owing to the heavy tax on brandy for fortifying sweet wines, the quantity fell off enormously last season (August to December, 1915), the quantity produced being only about one-fifth of the usual production of wine, and one-third of that of brandy. The quantity of wine made was only 3,882,953 gallons, the lowest since 1893; and of brandy 2,613,286 gallons, the smallest quantity since 1899.

Production of Sweet Wines in the United States in 1913-1915.

State	Gallons 1913	Gallons 1914	Gallons 1915
New Jersey, port	8,045	18,845	17,373
New Jersey, sweet catawba	------------	716	1,982
New York, port	175,279	200,853	58,694
New York, sweet catawba	462,510	371,370	214,396
North Carolina, scuppernong	92,031	47,752	------------
Virginia, scuppernong	581,672	215,550	------------
Ohio, sweet catawba	------------	------------	1,015
Ohio, scuppernong	------------	------------	6,863
Fractional gallons	3	2	1
Totals	1,319,540	855,088	300,324
California	17,927,812	17,473,353	16,868,374
Total, United States	19,247,352	18,328,441	17,168,698

Production of Fruit Brandy in the United States, 1913-1915.

State	Gallons, 1913	Gallons, 1914	Gallons, 1915
Sweet wine making states:			
New Jersey	64,609	75,888	95,778
New York	90,347	70,606	116,454
North Carolina	2,208	239	1,114
Ohio	167,291	100,621	100,734
West Virginia	127		
Other states	455,731	295,424	301,491
Totals	780,313	542,778	615,571
California	7,472,561	6,765,119	7,906,380
Totals, United States	8,252,874	7,307,897	8,521,951

The amount of fruit brandy produced in California in 1915 was 7,906,380 gallons, and in all the other states only 615,571 gallons, the total for the United States being 8,521,951 gallons.

In the production of wine previous to 1891, it is not possible to arrive at the totals for each year as given in the census reports, owing to different classification. The wines made in wineries are included in separate returns under the head of "manufacturers," and the value of the product, instead of the quantity, is stated. The figures are as follows:

Wine Made in Wineries, 1860-1910.

Year	Establishments	Capital	Cost of material	Value of product
1860	11	$173,000	$53,030	$160,300
1870	139	658,420	203,631	662,553
1880	45	639,600	292,075	622,087
1890	128	3,729,413	840,222	1,738,863
1900	187	4,658,625	2,526,768	3,937,871
1910	181			8,936,848

*For the early history of wine production in California, see Report of 1912, pages 170-172 and Report of 1913, pages 152-157.

Great Wine Grape Vineyards.

Some of the California vineyards are now the largest and best cultivated in the world. In the southern part of the State there is the large vineyard of the Italian Vineyard Company at Guasti in San Bernardino County, comprising 3,547 acres of all the best varieties, including Alicante Bouchet, Zinfandels, Burger, Folle Blanche, and a dozen others. In central California there is the Wahtoke vineyard, near Reedley, in Fresno County, of 3,631 acres, with 2,500 acres already planted and in bearing and containing some twenty of the leading varieties; and in northern California there is the Vina vineyard, in Tehama County, which until the last year or two had 1,500 acres, mostly in Zinfandel and Burger but the vines are being removed to make way for orchard trees or other crops. This step has been taken because although the vineyard paid, it had become very foul with Johnson grass which could not be eliminated as long as the vines were left in place. These are the most vineyards in the State.

There is no reliable data available regarding the production of the various kinds of dry wine, but since 1890 the exact figures for sweet wines and brandy have been recorded, and are here given, so that a comparison can be made. The quantity of sweet wine has increased during the last twenty years from 1,083,000 gallons in 1891 to 23,467,000 in 1912 (Aug.-Dec., 1911), which is the heaviest in the history of the industry.

Port and sherry are the two leading wines, the former leading as a rule, but in some years the output of sherry comes to the front, as in 1903 and 1912, when it was upwards of 8,000,000 gallons. In the three years 1910-1912 the output of port was upwards of 9,000,000 gallons. Muscatel and Angelica are the next favorites, followed by Malaga and Tokay.

The imports of foreign wines have remained steady during the last few years, the value being about $10,000,000 annually.

It is acknowledged that the best wines of California and of South America are equal to those produced in Europe. California grows the principal wine grapes of France, Italy, Spain, Portugal and Germany, and the variety of types of wines produced is unequaled by any country in the world. Conditions suitable for the growth of any variety, including the American varieties of the eastern states, are found here.

Surplus table and shipping grapes are used for the manufacture of wine, but the qualities desirable in a shipping grape differ from those of a good wine grape and the product is inferior. They are more suitable for making brandy, which is their principal use. Surplus raisin grapes are used for the same purposes, but the quality is somewhat better. Large quantities of sweet wine and brandy are made from the Muscat of Alexandria and form a special type of their own.

The great bulk of all the dry and sweet wines and of brandy is made from a special wine grape which is unsuited for other purposes.

Wine Grapes Used in California.*

Practically all the principal wine grapes of Europe have been introduced into California and tested. About four-fifths of the wine, both dry and sweet, however, is made from about a dozen varieties, and between forty and fifty will include over 95 per cent of the wine grapes.

The Zinfandel is the typical red wine grape of California and is grown in larger quantities than any other. From it the bulk of dry and sweet red wines is made. The proportion of Zinfandel, however, tends to diminish in newer plantings. Other red wine varieties largely planted are Carignane, Petite Sirah, Mataro, Petit Bouschet, Alicante Bouchet, Grenache, Blue Elbling and Charbono. The commonest white wine grapes are Burger, Colombar, Palomino, Green Hungarian, Feherzagoes and Muscat of Alexandria. Of table and raisin grapes, used largely for wine making, the principal are, besides the Muscat, Flame Tokay, Malaga, Sultanina (Thompson's Seedless) and Verdal.

The fine wines are made principally of Petite Sirah, Colombar and Semillon, though a large number of other fine varieties are used in varying amounts.

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*Professor Frederic T. Bioletti, of the University of California.

The yield of average vineyards varies from one or two tons per acre to eight or ten tons. This difference depends principally on the soil and climate and on the methods of the grape grower. Some varieties have the reputation of being heavy bearers and some of being light. The differences, however, are more those of proper adaptation to conditions and the use of proper viticultural methods.

Wine Grapes Recommended for California.

FOR COOLER REGIONS.

Fine wines of Rhine types: Franken Riesling, Johannisberger, Traminer.

Fine wines of Sautern type: Semillon, Colombar, Sauvignon Blanc.

Fine wines of Chablis type: Marsanne, Chardonay, Peverella.

Bulk white wines: Palomino, Green Hungarian.

Fine wines of Medoc type: Cabernet Sauvignon, Beclan, Blue Portuguese, Verdot, Merlot.

Fine wines of Hermitage type: Petite Sirah, Mondeuse, Tannat.

Bulk red wines: Zinfandel, Carignane.

FOR WARMER REGIONS.

Fine white wines: Franken Riesling, Johannisberger, Vernaccia Sarda, Marsanne.

Bulk white wines: Burger, Folle Blanche, West's White Prolific.

Fine red wines: Valdepeñas, St. Macaire, Lagrain, Gros Mansenc, Barbera, Refosco.

Bulk red wines: Zinfandel, Alicante Bouchet.

FOR SWEET WINES.

Fine white: Furmint, Beba, Boal.

Bulk white: Palomino, Perruno, Mourisco, Branco.

Fine red: Trousseau, Tinta Madeira.

Bulk red: Grenache, Mission, Monica, California Black Malvoisie, Tinta Amerella, Alicante Bouchet.

Muscat: Muscat of Alexandria, Frontignan.

Some varieties, such as the Riesling, give fine wines, though of different character, wherever they are planted. Others produce a fine wine in one locality and a poor wine in another. The Cabernet Sauvignon produces a fine wine in the cooler regions and a harsh, disagreeable wine in the hot regions. The Valdepeñas produces a better wine in the hot interior than in the coast regions.

Most of the varieties recommended for bulk wines are capable of yielding fine wines under favorable conditions, when blended with a sufficient quantity of finer varieties.

The production of wine and brandy is given for the fiscal year ending June 30th, but as almost all the wine is made in the fall of the year, the vintage of sweet wines is really that of the previous year.

The production of sweet wine in the State during the 1915 season (August to December) fell off enormously, owing to the prohibitive tax levied by the Federal government under the emergency revenue act of October 22, 1914, the total vintage amounting to only 3,882,953 gallons, the smallest quantity since 1893. The production of brandy also fell off, the total quantity produced being only 2,613,286 gallons, or about one-third of the usual production, and the smallest since the year 1899.

The Vintage Season of 1915.*

	Gallons
Port	2,214,598.28
Sherry	988,642.70
Angelica	343,495.72
Muscat	334,952.73
Tokay	1,284.26
Total	3,882,953.69

The total amount of brandy produced in the fiscal year 1915 was 7,906,380 gallons, and the quantity used for fortification 4,425,747 gallons, and the quantity of dry wines is estimated at 21,571,000 gallons.

Dry Wines.

The State Board of Viticultural Commissioners estimate the dry wine vintage in 1915 as follows:

	Gallons
Alameda County and bay cities, including wine made in cellars of foreigners in San Francisco	3,048,000
Napa County	4,708,000
Contra Costa County	870,000
Mendocino County	372,000
Sonoma County	7,493,000
Santa Clara County	2,591,000
Santa Cruz County	47,000
Sacramento County	590,000
Lodi section	1,500,000
Fresno section	250,000
Southern California	2,250,000
Various other localities	650,000
Total	21,571,000

This total of dry wine production is somewhat short of the normal, which is in the neighborhod of 25,000,000 gallons.

Sparkling Wines.

The manufacture of sparkling wines is now engaging the attention of the wine makers in California and promises to be successful. The production of naturally fermented champagne in the bottle during the last three years has steadily increased, the total being estimated as follows:

Year	Bottles
1911	580,000
1912	800,000
1913	1,000,000
1914	1,100,000
1915	732,000

The bottling is done in the months of June and July of the following year.

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*See Bulletin No. 6 of the State Board of Viticultural Commissioners.

Grape Juice.

The manufacture of grape juice in this State continues to decrease. The best authorities place the quantity at about 50,000 to 60,000 gallons, and it is claimed that so far there is no profit in its manufacture.

Many judges consider that some of the eastern varieties of grapes, such as the Concord, are better suited for the making of grape juice.

Beer.

The amount of beer produced in California during the last three years, shows a steady decrease.

Year	Number of barrels	Amount of tax paid
1913	1,007,326	$1,007,326
1914	973,217	1,053,887
1915	937,665	1,406,479

Prices of Wine Grapes.

The prices paid for grapes vary considerably, according to the varieties and districts, and also according to the size of the crop from year to year.

In Fresno County, in 1911, the price paid for average sweet wine grapes (not including Muscats) was $10 per ton, and in 1912 from $5 to $6 per ton.

In other parts of the San Joaquin Valley and the Sacramento Valley $9 per ton was paid for average wine grapes in 1911, and as high as $11 for special varieties. In 1912 standard grapes were $6 per ton, and for special varieties, or under contract, as high as $10 per ton. During the year 1913 the average price was $10 per ton, and $27.50 per ton in dry wine districts in the coast counties. In 1914 the price paid to growers ranged from $6 a ton for culls to $14 for prime varieties. The price paid for grapes for dry wines ranged from $10 to $18 per ton, according to districts; in some localities as high as $25 per ton was paid for choice varieties. For the vintage season of 1916, $14 per ton is being offered, a better price than for several years.

California Brandy.

The following summary shows that almost all the brandy made in the United States is produced by California. In 1915 California produced 7,906,380 gallons, and all other states only 615,571 gallons.

Total Fruit Brandy Produced in the United States, 1891-1915.

For the fiscal year ending June 30th	Production of fruit brandy, including apple, peach, and grape, gallons
1891	1,804,712
1892	3,667,465
1893	2,358,548
1894	2,948,159
1895	1,960,176
1896	3,403,852
1897	1,813,427
1898	2,906,198
1899	3,097,769
1900	3,760,487
1901	4,047,602
1902	4,220,400
1903	6,430,673
1904	5,193,262
1905	5,448,584
1906	4,444,072
1907	6,138,304
1908	6,899,823
1909	6,440,857
1910	7,656,433
1911	7,953,131
1912	9,321,823
1913	8,252,874
1914	7,307,897
1915	8,521,951

Under the provisions of "An act to reduce revenue and equalize duties on imports, and for other purposes," approved October 1, 1890, provision was made for the fortification with grape brandy, free of tax, of pure sweet wine, and of wine intended for exportation. This act was amended by the acts of June 7, 1906, which imposed a tax of 3 cents per gallon, and on October 22, 1914, the tax was increased to 55 cents per gallon until January 1, 1916. The full tax on brandy is $1.10 per gallon. The amount used in this State for the fiscal year ending June 30, 1915, was 4,124,371 gallons at 3 cents, and 301,376 at 55 cents. Since that year exact returns have been kept by the Internal Revenue Department of the quantity of the various kinds of wines produced and the amount of brandy used for fortification.

Brandy From Other Fruits.

Brandy is also produced from other fruits, and until 1908 was shown separately from grape brandy in the internal revenue returns; since then all brandy is included under the head of "fruit brandy." The quantity, however, is not large; in 1908, the last year the varieties are shown separately, fruit brandy, other than grape brandy, was only 94,558 gallons, while grape amounted to 5,367,489 gallons.

Variety and Quantity of Fruit Brandy.

Varieties	Gallons
Prune	60,594
Peach	21,210
Pear	9,339
Apricot	2,178
Apple	897
Orange	280
Fig	30
Berry	30
Total	94,558

The production of brandy has also greatly increased; in 1891 the quantity amounted to 1.804.712 gallons. Considerably more than one-half of this is used for fortifying the sweet wines, the amount used for this purpose in 1915 amounting to 4,425,747 gallons of the 7,906,380 gallons produced.

SUMMARY OF CALIFORNIA VINTAGES,* 1890-1915.

(For the fiscal year ending June 30th.)

Year	Sweet wine, gallons	Dry wine, gallons	Total wine, gallons	Brandy used for fortification
1890			14,626,000	
1891	1,083,274	18,900,000	19,983,274	193,557
1892	2,746,655	12,200,000	14,946,655	695,844
1893	2.652.480	22,000,000	24,652,480	617,593
1894	4,724,595	9,200,000	13,924,595	1,112,794
1895	4,242,600	13,700,000	17,942,600	1,018,483
1896	6,084,009	10,900,000	16,984,009	1,484,887
1897	4,968,339	11,400,000	16,368,339	1,174,466
1898	7,024,372	24,400,000	31,424,372	1,688,949
1899	7,779,031	11,200,000	18,979,031	1,860,721
1900	8,433,383	15,000,000	23,433,383	2,063,033
1901	9,177,560	13,000,000	22,177,560	2,220,659
1902	9,301,353	33,600,000	42,901,353	2,292,721
1903	16,059,747	18.500,000	34,559,747	4,011,865
1904	13,571,845	16,000,000	29,571,845	3,329,804
1905	13,161,198	18,000,000	31.161,198	3,260,421
1906	11,502,309	29,000,000	40,502,309	2,998,998
1907	15,657,572	26,800,000	42,457,572	3,962,352
1908	16,491,169	27,700,000	44,191,169	4,233,977
1909	14,368,025	33,900,000	48,268,025	3,678,376
1910	18,086.868	27,400,000	45,486,868	4,702,863
1911	18,850.167	26.000,000	44,850,167	4,951,640
1912	23,467,444	25,000,000	48,467,444	6,153,131
1913	17,927,812	22,000,000	39,927,812	4,671,415
1914	17,473,353	26,300,000	43,773,353	4,643,812
1915	16,868,374	21,571,000	38,439,374	4,425,747

*The above figures for sweet wine and brandy are exact; the amount of dry wine can only be estimated, as no complete records are kept. Wines being made in the fall, the vintages belong to the previous year, thus the vintage for the year ending June 30, 1914, was mostly made from August to December, 1913.

Total Production of Sweet Wines by Vintages—1909-1915.*

(For the fiscal year ending June 30th.)

(Gallons.)

Varieties	1909	1910
Angelica	919,540	1,361,290
Lenoir	-----	-----
Malaga	73,518	81,175
Moselle	-----	-----
Muscatel	2,242,412	1,767,387
Madeira	51,716	2,785
Port	5,859,630	9,051,017
Sherry	5,189,598	5,690,080
Tokay	31,607	133,132
Fractional gallons	4	2
Totals	14,368,025	18,086,868

Varieties	1911	1912	1913	1914	1915
Angelica	1,241,431	2,609,518	1,640,738	1,195,641	1,305,978
Malaga	223,739	327,172	184,308	288,170	75,818
Muscatel	1,087,411	2,247,219	2,070,827	1,512,727	1,095,411
Madeira	363,455	119,781	48,714	40,914	81,636
Port	9,780,864	9,522,237	8,334,993	9,160,980	9,240,281
Sherry	5,955,886	8,559,868	5,619,502	5,235,102	5,018,983
Sweet Catawba	9,497	-----	-----	-----	-----
Tokay	187,882	81,645	28,725	39,816	50,262
Fractional gallons	2	4	5	3	5
Totals	18,850,167	23,467,444	17,927,812	17,473,353	16,868,374

*For vintages, from 1891-1908, see Report for 1912, pages 181-182.

SUMMARY OF WINES PRODUCED, BY VARIETIES, 1891-1915.

(Gallons.)

(For the fiscal year ending June 30th.)

Year	Angelica	Frontignan	Lenoir	Madeira	Malaga
1891	182,208	-----	-----	-----	3,248
1892	379,964	-----	-----	-----	62,000
1893	339,590	-----	-----	-----	-----
1894	386,860	-----	-----	-----	42,929
1895	364,297	6,133	949	-----	2,795
1896	466,156	6,327	6,081	-----	2,906
1897	330,032	9,020	-----	2,269	-----
1898	748,686	-----	-----	-----	11,614
1899	438,419	3,048	-----	-----	14,267
1900	870,195	-----	-----	-----	975
1901	548,095	-----	-----	901	-----
1902	465,104	-----	-----	-----	-----
1903	887,238	-----	-----	-----	-----
1904	1,029,404	-----	-----	-----	81,136
1905	1,187,683	-----	-----	-----	18,847
1906	566,604	-----	-----	-----	8,098
1907	1,009,600	-----	-----	-----	11,899
1908	1,513,534	-----	452	13,316	216,390
1909	919,540	-----	-----	51,716	73,518
1910	1,361,290	-----	-----	2,785	81,175
1911	1,241,431	-----	-----	363,455	223,739
1912	2,609,518	-----	-----	119,781	327,172
1913	1,640,738	-----	-----	48,714	184,308
1914	1,195,641	-----	-----	40,914	288,170
1915	1,305,978	-----	-----	81,636	75,818

SUMMARY OF SWEET WINE PRODUCED, BY VARIETIES, 1891-1915.

(Gallons.)

(For fiscal year ending June 30th.)

Year	Muscatel	Port	Sherry	Sweet Catawba	Tokay
1891	106,922	663 668	124,837	------------	2,391
1892	145,735	1,723,744	423,383	555	5,686
1893	353,299	1,535,227	424,138	226	------------
1894	400,064	2,808,832	1,084,714	------------	1,193
1895	188,437	2,309,702	1,370,284	------------	------------
1896	863,227	2,613,734	2,118,942	------------	6,634
1897	960,897	1,670,495	1,994,649	------------	974
1898	721,556	3,158,545	2,372,197	------------	11,772
1899	819,105	3,441,592	3,053,163	------------	9,433
1900	868,388	3.949,631	2,697,682	------------	46,508
1901	1,611,116	4,407,250	2,597,377	------------	12,819
1902	1,909,485	2,854,477	4,069,538	------------	2,749
1903	1,741,952	5,171,103	8,233,871	------------	25,580
1904	721,033	7,630,881	4,109,075	------------	316
1905	1,398,532	5,530,310	5,011,744	------------	14,080
1906	933,647	5,322,203	4,648,305	------------	23,448
1907	1,484,447	7,708,226	5,443,397	------------	------------
1908	2,449,211	6,015,052	6,267,323	------------	12,400
1909	2,242,412	5,859,630	5,189,598	------------	31,607
1910	1,767,387	9,051,017	5,690,080	------------	133,132
1911	1,087,411	9,780,864	5,955,886	------------	187,882
1912	2,247,219	9,522,237	8,559,868	------------	81,645
1913	2,070,827	8,334,993	5,619,502	------------	28,725
1914	1.512,727	9,160,980	5,235,102	------------	39,816
1915	1,095,411	9,240,281	5,018,983	------------	50,262

NOTE.—The wine is made in the fall of the previous year, which is the real date of the vintage, but the returns are made for the fiscal year ending June 30th.

In 1892, 5,588 gallons of Sauterne were reported, and in 1908, 3,488 gallons of Moselle, but this is probably an error, as neither can be classed as sweet wines.

CALIFORNIA BRANDY, 1891-1915.

(For fiscal year ending June 30th.)

Year	Produced	Number of fruit distilleries		
		Used for fortification of sweet wines	Registered	Operated
1891	1,474,876	193,557	288	284
1892	2,197,613	695,844	298	295
1893	1,642,284	617,593	292	286
1894	2,256,607	1,112,794	272	267
1895	1,677,082	1,018,483	270	268
1896	2,066.404	1,484,887	235	229
1897	1,439,285	1,174,466	239	237
1898	2,382,241	1,688,949	267	267
1899	2,775,164	1,860,721	238	232
1900	3,060,078	2,063,033	208	194
1901	3,194,544	2,220,659	222	212
1902	3,464,391	2,292,721	213	209
1903	5,614,215	4,011,865	230	223
1904	4,451,928	3,329,804	225	216
1905	4.602,133	3,260,421	224	218
1906	3,864,080	2,998,998	224	201
1907	5,367,489	3,962,352	209	193
1908	*6,388,076	4,233,977	216	202
1909	*5,971,171	3,678,376	206	201
1910	*7.170,212	4,702,863	203	195
1911	*7,316,488	4,951,640	211	202
1912	*8,721,693	6,153,131	192	181
1913	*7,472,561	4,671,415	184	179
1914	*6,765,119	4,643,812	189	183
1915	7,906,380	4,425,747	175	163

*Including fruit brandy other than grape but the quantity is very small.

IMPORTS AND EXPORTS OF WINE AND BRANDY, 1891-1915.

Wines Imported.

Year	Champagne and other sparkling		Still wines in casks		Still wines in bottles		Total value of wines
	Doz. qts.	Value	Gallons	Value	Doz. qts.	Value	
1891	400,084	$5,615,872	3,860,503	$2,641,816	348,666	$1,749,372	$10,007,060
1892	319,592	4,571,816	3,477,989	2,464,484	365,140	1,908,203	8,944,503
1893	374,124	5,579,054	3,525,625	2,505,024	413,860	2,121,275	10,205,353
1894	237,360	3,498,522	2,599,693	1,817,813	296,097	1,423,143	6,739,478
1895	257,757	3,807,961	2,789,153	1,945,347	296,779	1,430,229	7,183,537
1896	246,393	3,628,319	2,834,898	1,950,770	314,190	1,527,916	7,107,005
1897	228,628	3,348,004	2,997,952	2,039,250	309,281	1,475,211	6,862,465
1898	223,827	3,264,323	1,930,870	1,392,710	268,921	1,312,147	5,969,180
1899	262,371	3,668,791	2,253,226	1,573,573	274,873	1,347,842	6,590,206
1900	310,149	4,114,908	2,533,828	1,744,736	315,920	1,560,851	7,421,495
1901	311,078	4,589,494	2,785,850	1,942,322	373,832	1,687,420	8,219,236
1902	335,256	4,930,768	3,300,026	2,143,433	397,818	1,846,937	8,921,138
1903	407,944	5,861,639	3,753,211	2,292,297	440,869	2,095,360	10,249,296
1904	336,245	4,969,635	4,007,691	2,387,018	471,153	2,035,217	9,391,870
1905	371,811	5,723,764	3,973,919	2,352,485	488,773	2,165,672	10,241,921
1906	415,394	6,127,062	4,482,499	2,567,712	546,688	2,299,194	10,993,968
1907	419,403	6,228,281	5,213,458	2,966,154	636,938	2,614,346	11,808,781
1908	366,669	5,221,070	5,443,782	3,008,996	628,428	2,516,461	10,746,527
1909	436,628	6,863,785	5,747,056	2,838,232	650,861	2,574,596	12,276,613
1910	391,003	6,302,377	7,100,661	3,527,896	822,243	3,177,020	13,007,293
1911	218,495	3,566,824	4,812,787	2,638,039	596,521	2,326,750	8,531,613
1912	281,134	4,688,090	3,864,071	2,488,744	577,244	2,414,621	9,591,451
1913	280,828	4,636,191	4,417,130	2,718,045	677,111	2,724,471	10,078,707
1914	270,002	4,418,958	5,220,380	2,757,434	728,303	2,940,277	10,116,669
1915	114,630	2,004,680	3,860,273	1,968,587	626,865	2,273,916	6,247,183

Brandy Imported, 1891-1915.

(Duty, brandy and other spirits, $2.60 per proof gallon.)

Year	Proof gallons	Value
1891	443,278	$1,139,315
1892	333,234	889,883
1893	326,303	918,165
1894	201,433	568,458
1895	313,327	813,882
1896	250,704	690,761
1897	337,595	911,721
1898	137,902	395,758
1899	219,968	626,875
1900	244,100	696.540
1901	290,301	843,318
1902	316,222	911,419
1903	348,878	1,000,997
1904	390,988	1,104,410
1905	403,386	1,139,129
1906	470,433	1,286,270
1907	629,333	1,687,473
1908	592,382	1.523,842
1909	764,244	1,961,170
1910	716,259	1,899,021
1911	409,242	1,018,382
1912	509,286	1,316,031
1913	610,358	1,647,277
1914	602,563	1,617,483
1915	400,203	1,035,562

Duty on Imported Wines, Etc.

Wine containing more than 24 per cent of alcohol is classed as spirits and charged accordingly. Champagne and sparkling wines $9.60 per dozen quarts, $4.80 per dozen pints. Half pints $2.40 per dozen. Bottles containing more than one quart to pay at the rate of $3.00 per gallon on the excess. Still wines in casks, if containing 14 per cent or less of alcohol, 45 cents per gallon; above 14 per cent, 60 cents per gallon. In bottles, per case of one dozen quarts, or two dozen pint bottles, $1.85 per case. Bottles containing more than the above, 6 cents per pint on the excess. Duty on brandy and other spirits, $2.60 per proof gallon.

Domestic Wines and Brandy, 1891-1915.

(Exported.)

Year	Casks		Bottled		Total value of wines	Brandy proof gallons	Value
	Gallons	Value	Dozen bottles	Value			
1891	543,292	$319,085	11,409	$52,392	$371,477	136,529	$111,657
1892	655,795	371,344	14,834	67,686	439,030	216,696	178,294
1893	708,558	369,893	11,128	51,654	421,547	123,518	90,731
1894	802,192	380,588	13,813	63,860	444,448	361,653	291,022
1895	1,125,297	545,708	13,919	56,202	601,910	100,719	94,924
1896	1,339,090	581,827	17,147	69,460	651,287	89,259	87,294
1897	1,389,375	629,270	16,794	69,444	698,714	11,815	12,640
1898	1,623,103	682,028	9,672	46,721	728,749	24,886	39,455
			Dozen quarts				
1899	1,498,078	624,315	10,973	52,015	676,330	20,944	29,289
1900	1,408,859	575,665	9,854	49,927	625,592	80,259	83,698
1901	1,117,858	461,560	9,901	43,013	504,573	15,323	28,176
1902	929,900	407,345	10,952	42,980	450,325	24,077	30,174
1903	678,150	290,552	5,232	24,624	315,176	18,117	19,213
1904	896,643	403,557	6,066	33,136	436,693	70,193	44,119
1905	839,386	355,215	5,800	28,242	383,457	21,171	18,217
1906	789,526	326,335	5,596	25,215	351,550	5,145	8,553
1907	560,147	251,353	4,404	20,128	271,481	14,172	22,496
1908	438,676	195,160	6,273	30,830	225,990	2,750	4,900
1909	415,891	181,516	3,839	19,902	201,418	14,718	12,262
1910	501,348	193,597	5,962	31,314	224,911	---------	---------
1911*	1,394,994	---------	---------	---------	518,536	---------	---------
1912*	957,120	---------	---------	---------	366,260	---------	---------
1913†	1,075,151	---------	---------	---------	418,668	---------	---------
1914	941,357	---------	---------	---------	373,412	---------	---------
1915	819,310	---------	---------	---------	332,369	---------	---------

Brandy was included under "Alcohol" prior to 1891, and included in "All other spirits" after 1910.

*Not stated in detail after 1910. The quantity includes wines both in casks and bottles.

PART VI.

IRRIGATION

Description of Irrigation Enterprises; Source of Water Supply; Cost of Irrigation; Irrigated Crops, and Orchards; Dry Farming; Irrigation Districts; Colorado River and Salton Sea; Tulare and Other Lakes; Summary of Agricultural and Irrigated Areas; Irrigation from Underground Waters; California Rivers and Creeks; Acreage of Irrigated Farms by Counties.

Farms and Irrigation.

In most sections of California there is usually sufficient rainfall for the maturing of some crops, although there are other sections where no crops can be grown without irrigation. The normal annual precipitation ranges from about 2 inches in the Imperial Valley, in the southeastern part of the State, to about 60 inches along the coast in the northwestern part.

Irrigation is practiced to some extent throughout the State, but the largest part of the irrigated land lies in the southern part of the Sacramento and the San Joaquin valleys and in the northern part of the State.

In 24 of the 58 counties in the State more than half the farms are irrigated. Imperial County has the largest percentage of farms irrigated, 94.6, and Inyo County the next largest, 93.2 per cent. In both 1900 and 1910 the county for which the largest area of irrigated land was reported was Fresno, with an irrigated acreage of 402,318, compared with 283,737 in 1900. In Tulare County 265,404 acres were irrigated in 1910, and in five other counties the area irrigated exceeded 100,000 acres. The summary on pages 195-196 shows that in 1910 existing enterprises were ready to supply water to 3,619,378 acres, or 955,274 acres more than were irrigated in 1909. The acreage included in projects exceeded the acreage irrigated in 1909 by 2,826,256 acres, which is more than twice the acreage brought under irrigation in the last decade. This acreage represents the area which will be available for the extension of irrigation in the next few years, upon the completion of projects now under way and without new undertakings.

Description of Enterprises.

Name	Acreage irrigated	Per cent distribution
United States Reclamation Service	400	*
United States Indian Service	3,490	0.1
Irrigation districts	173,793	6.5
Co-operative enterprises	779,020	29.2
Commercial enterprises	746,265	28.0
Individual and partnership enterprises	961,136	36.1
Totals	2,664,104	100.0

*Less than one-tenth of one per cent.

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction, and for the operation and maintenance of irrigation works.

Co-operative enterprises, which are controlled by the water users under some organized form of co-operation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who own no interest in the works. Persons obtaining water from such enterprises are usually required to pay for the right to receive water, and to pay, in addition, annual charges based in some instances on the acreage irrigated and in others on the quantity of water received.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization. It is not always possible to distinguish between partnership and co-operative enterprises, but as the difference is slight this is unimportant.

Irrigation districts, co-operative enterprises and individual and partnership enterprises, which together supply about 72 per cent of the acreage irrigated, are all controlled by the water users. Commercial enterprises, the only other class in the State that irrigates any extensive acreage, supplies 28 per cent.

The United States Reclamation Service operates under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands.

The United States Indian Service operates under various acts of Congress, providing for the construction by that service of works for the irrigation of land in the Indian reservations.

The Carey act, or Federal law of August 18, 1894, granted to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation.

Irrigation districts are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes, with the object of obtaining funds for the purchase or construction, and for the operation and maintenance of irrigation works.

Co-operative Enterprises. These are controlled by the water users under some organized form of co-operation. The most common form is a stock company, the stock of which is owned by the water users.

Commercial enterprises supply water to parties who own no interest in the works. Persons obtaining water from such enterprises are usually required to pay for the right to receive water and to pay, in addition, annual charges based in some instances on the acreage irrigated and in others on the quantity of water received.

Individual and partnership enterprises belong to individual farmers or to neighboring farmers, who control them without formal organization. It is not always possible to distinguish between partnership and co-operative enterprises, as the difference is slight.

Source of Water Supply.

As in other states, streams are the principal sources of supply of water for irrigating, but in California wells supply much more land than in any other state. Much land receives water from both sources, but most of this is credited to streams. The watersheds of the principal streams are protected by national forests administered by the United States Forest Service which affords to them effective protection against denudation either by forest fires or the unregulated cutting of their timber.

Source	Acreage irrigated	Per cent distribution
Streams	2,246,722	84.3
Lakes	18,470	0.7
Wells	350,723	13.2
Springs	31,779	1.2
Reservoirs	16,410	0.6
Totals	2,664,104	100.0

The preceding figures show the extent to which underground water is utilized for irrigation in California. The flowing wells, of which there were 2,361, with a total capacity of 477,343 gallons per minute, irrigated 74,128 acres. The great majority of these wells are in southern California and the San Joaquin Valley, and the land thus irrigated is situated in Kern, Kings, Los Angeles, Orange, Riverside, San Bernardino, Santa Clara, and Tulare counties. Of the 10,724 pumped wells, 5 248 were in the counties named and 4,503 in Fresno, Merced, Monterey, Sacramento, San Benito, San Diego, San Joaquin, and Ventura counties. The pumped wells in these two groups of counties irrigated 258,687 of the 276,595 acres irrigated by such wells in the entire State. Pumping from lakes and streams has also been practiced extensively in many sections of the State, 32,539 acres having been irrigated in this way in 1909.

The Cost of Irrigation.

The following summary shows the total cost of irrigation enterprises up to July 1, 1910, including construction of works and acquisition of rights, but not operation and maintenance, with the average cost per acre, based on the acreage the enterprises were capable of irrigating in 1910:

	1900	1910	Increase, per cent
Cost of irrigation enterprises	*$19,181,610 00	$72,580,030 00	278.3
Average per acre	†13 27	20 05	
Estimated final cost of existing enterprises		84,392,344 00	
Average per acre included in projects		15 37	

*Exclusive of those on Indian reservations.
†Exclusive of 242 acres in Indian reservations.

The cost of irrigation systems shows the largest increase of any item, amounting to 278.3 per cent. In the average cost per acre there was also a considerable increase, compared with 1900. The large increased cost of irrigation enterprises is due in a considerable measure to the expensive equipment installed to secure a water supply and protect it from loss by seepage and evaporation, in sections where water is scarce and crop values are high. A number of large enterprises are under construction upon which considerable expenditures have been made, but which are irrigating little land as yet, making the average cost higher than the true average. The average, based on the estimated final cost and the acreage included in projects, $15.37 per acre, probably more truly represents the average cost per acre of irrigation in California.

In the county showing the lowest average cost, Mono, where much of the irrigated land consists of flooded pastures, enterprises were capable of irrigating in 1910 at $1.29 per acre. The highest average cost per acre, $368.40, is in Nevada County, where the unusual cost is due to the fact that many of the ditches now used for irrigation were originally constructed at heavy expense for mining purposes.

Irrigated Crops.

(From the Reports of the Bureau of the Census.)

The information relating to irrigated crops is to some extent incomplete; it shows, however, the relative importance of the different irrigated crops, and is sufficiently complete to afford reliable averages of yields and for comparison with totals for the State.

Acreage Yield.

Crop	Total for State	Irrigated		Total for State	On irrigated land
		Amount	Per cent of total		
Cereals—				Bushels	Bushels
Corn	51,935	17,802	34.3	1,273,901	491,978
Oats	192.158	5,903	3.1	4,143,688	205,727
Wheat	478,217	22,603	4.7	6,203,206	408,706
Barley	1,195.158	77,785	6.5	26,441,954	1,844,971
Rye	7,027	107	1.5	70,683	1,265
Other grains and seeds—					
Alfalfa seed	8,761	2,570	29.3	23,791	5,911
Dry edible beans	157,987	11,384	7.2	3,328,218	244,624
Dry peas	2,959	290	9.8	57,468	9,902
Hay and forage—				Tons	Tons
Timothy alone	13,725	8,026	58.5	20.001	11,236
Timothy and clover mixed	46,661	20,880	44.7	73,183	34,177
Clover alone	8,519	1,176	13.8	20,380	2,689
Alfalfa	484,134	366,692	75.7	1,639,707	1,280,105
Other tame or cultivated grasses	92,556	6,504	7.0	122.103	10,656
Wild, salt or prairie grasses	253,127	153,672	60.7	281.033	189,964
Grains cut green	1,604,745	101,187	6.3	2,019,526	146,013
Coarse forage	25,868	7,593	29.4	60,611	19,151
Sundry crops—				Bushels	Bushels
Potatoes	67.688	32,735	48.4	9,824,005	5,180,006
				Tons	Tons
Sugar beets	78,671	14,657	18.6	843,269	171,494
Orchard fruits	*	73.491	*	----------	----------
Small fruits	9,687	6,876	71.0	----------	----------
Tropical fruits	*	98,969	*	----------	----------
Nuts	*	22,429	*	----------	----------
Grapes	*	74,984	*	----------	----------

*Agricultural returns only give number of trees, not acreage.

Acreage of Irrigated Crops.

Of the entire acreage of the crops in the preceding table, slightly less than one-fifth is irrigated, the proportion irrigated varying widely for the different crops.

The cereals are very generally grown without irrigation, only 6.5 per cent of the total acreage of the cereal crop above given being irrigated. The hay and forage crops are more generally irrigated than the cereals, the irrigated acreage forming 26.3 per cent of the total for these crops, alfalfa being the highest, 75.7 per cent. Of the entire acreage for potatoes 48.4 per cent was irrigated, and that in small fruits 71 per cent.

Sugar beets are grown for the most part without irrigation in California, only 18.6 per cent of the total acreage of the crop being irrigated. While many of the crops irrigated are well distributed geographically, there is a tendency toward the concentration of certain crops in particular localities.

Irrigation Acreage in Orchards.

The following summary gives the counties having the largest acreage of the principal irrigated crops, with the proportions which each contains of the total irrigated acreage of these crops in the State:

Of the orchard fruits irrigated: Fresno County has 31.9 per cent; Placer, 14.8 per cent; Tulare, 8.4 per cent; Santa Clara, 6.5 per cent.

Of small fruits: Los Angeles County, 30.4 per cent; Santa Clara, 13.9 per cent; Sacramento, 10.9 per cent; Santa Cruz, 7.2 per cent.

Tropical fruits: San Bernardino County, 25.6 per cent; Los Angeles, 24.8 per cent; Riverside, 14.2 per cent; Tulare, 11.6 per cent.

Nuts: Orange County, 46 per cent; Los Angeles, 34.7 per cent; Ventura, 12.1 per cent.

Grapes: Fresno County, 62.6 per cent; Tulare, 12.2 per cent; Kings, 6.2 per cent; Sacramento, 5.7 per cent.

Of the total irrigated acreage of fruit trees and vines not bearing in 1909, amounting to 59,031, 36.1 per cent was in Fresno County, 14 per cent in Tulare County, 8 per cent in Orange County, and 7.2 per cent in Los Angeles County.

SUMMARY OF IRRIGATED FARMS AND IRRIGATION ENTERPRISES IN 1900 AND 1910.

	1900	1910	Increase	Per cent
Number of farms in State	72,542	88,197	15,655	21.6
Number of farms irrigated	25,675	39,352	13,677	53.3
Acreage irrigated	1,446,114	2,664,104	1,217,990	84.2
Acreage enterprises were capable of irrigating in 1910	*	3,619,378		
Acreage included in projects	*	5,490,360		
Percentage of number of farms irrigated	35.4	44.6	9.2	
Percentage of improved lands in farms irrigated	12.1	23.4	11.3	
Irrigation enterprises—				
Number of independent enterprises	*	13,970		
Total length of ditches (miles)	*	21,129		
Number of main ditches	*	8,590		
Length of main ditches (miles)	*	12,620		
Capacity of cubic feet per second	*	89,597		
Number of lateral ditches	*	6,143		
Length of lateral ditches (miles)	*	8,509		
Number of reservoirs	*	1,583		
Capacity (acre feet)	*	743,269		
Number of flowing wells	*	2,361		
Capacity, gallons per minute	*	477,343		
Number of pumped wells	*	10,724		
Capacity, gallons per minute	*	4,119,575		
Acreage irrigated with pumped wells	*	276,595		
Acreage irrigated with flowing wells	*	74,128		
Acres irrigated with pumped water from all sources, including lakes and streams	*	309,134		
Number of pumping plants	*	9,297		
Engine capacity, horsepower	*	128,143		
Pumping capacity, gallons per minute	*	5,276,298		
Total cost of irrigation systems	$19,181,610	$72,580,030	$53,398,420	278.3
Average cost per acre	$13.27	$20.05	$6.76	51.0

NOTE.—Reservoirs are those filled by collecting storm water, or from water courses that are usually dry. When reservoirs are filled from streams or wells the primary source is considered the source of supply. The "acre-foot" is the volume of water required to cover one acre to a depth of one foot or 43,560 cubic feet.

*Not reported in 1900.

Irrigation in 1910 Compared with the Year 1900.

The increase in irrigation during the last decade has been very large. The total number of farms irrigated was 39,352, against 25,657 in 1900, an increase of 13,677, or 53.3 per cent. The per cent irrigated of the whole number of farms was 44.6, compared with 35.4 per cent in 1900, showing an increase of 9.2 per cent during the ten years.

The total acreage irrigated in 1910 was 2,664,104 acres, against 1,446,114 acres in 1900, an increase of 1,217,990 acres, or 84.2 per cent. The total acreage which all enterprises were capable of irrigating in 1910 was 3,619,378, an excess of 955,274 acres over the area irrigated in 1909. The area included in projects either contemplated or under construction in 1910 was 5,490,360 acres. This indicates in a general way the area which will be available within the next few years for the extension of irrigation, and shows that the area irrigated in 1910 can be more than doubled without the construction of additional works.

The number of independent enterprises in 1910 was 13,970. The total length of all ditches was 21,129 miles, of which there were 8,590 main ditches, extending 12,620 miles, and 6,143 lateral ditches, with 8,509 miles. The length of main ditches in 1900 was 5,106 miles, showing an increase in the ten years of 7,493 miles, or 146.7 per cent.

The number of reservoirs reported was 1,583, having a capacity of 743,269 acre feet.

The number of wells pumped for irrigation was 10,724, with a capacity of 4,119,575 gallons per minute. The number of pumping plants was 9,297, with an engine capacity of 128,143 horsepower and a pumping capacity of 5,276,298 gallons per minute. The flowing wells numbered 2,361, with a capacity of 477,343 gallons a minute.

The total cost of irrigation systems in 1910 was $72,580,030, against $19,181,610 in 1900, an increase of $53,398,420, or 278.3 per cent.

The average cost per acre was $20.05 in 1910, against $13.27 in 1900.

Dry Farming.

The United States Government is not only interested in settling its irrigated lands, but also in developing all parts of its territory, and for this reason the various bureaus of the Department of Agriculture have been studying the soils of the West and also scouring the world to find crops suited for these regions. Dry farming is meeting with a certain amount of success in various parts of the country, and the combined efforts of all of these endeavors to make fertile and productive these lands will result in an era of unprecedented prosperity for the entire West.

Irrigation Projects.*

The Orland Project. This project is in the Sacramento Valley and includes about 14,000 acres in Glenn and Tehama counties, principally in the former. In 1913 upwards of 6,600 acres were irrigated, and in 1914, 7,354 acres. The principal crops raised were alfalfa 5,817 acres, pasture 4,099 acres, sorghum 146 acres, small fruit 22 acres, deciduous 88 acres, comprising apples, peaches, pears, prunes, and apricots, which produced approximately 10,200 boxes. There were also 90 acres in citrus fruits, 87 in almonds, 3 in nursery, and 72 in garden. The total value produced amounted to $176,331, or $26.99 per acre.

Yuma or Laguna Project. This project is principally in Arizona, but will cover about 17,000 acres of the Colorado desert, in Imperial County. The Laguna dam is situated on the Colorado River, about twelve miles above Yuma, and diversions will be made to both sides.

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*For details regarding the Orland Project, Yuma or Laguna Project, Klamath Project, also of the irrigation districts and private irrigation systems, the names of which follow, see Report for 1913, pages 171-175.

The land on the California side is included in the Yuma Indian reservations and all but 4,000 acres, reserved for the Indians, is open to bona fide settlers.

Klamath Project. This covers land in Oregon and California, and is largely a drainage proposition in California, being the reclamation of swamp land surrounding Lower Klamath Lake, and the lowering of the water level in Tule Lake, in Siskiyou and Modoc counties.

Receipts from the Sale of Public Lands in California for Irrigation Work to June 30, 1914.

	Value
Receipts from sale of land	$5,620,943 00
Allotments to June 30, 1914	3,048,162 00
Net investment to June 30, 1914	2,424,064 00

Project	Per cent chargeable to State	Allotments to June 30, 1914	Net investments to June 30, 1914
Yuma	17	$1,286,320 64	$1,160,024 95
Orland		918,000 00	631,218 81
Klamath	25	748,250 00	551,451 99
Colorado River	17	7,430 70	7,430 70
Colorado River basin	17	8,500 00	5 65
Iron Canyon		10,000 00	6,766 03
Owens Valley		12,061 92	12,061 92
Pit River		2,500 00	
Sacramento Valley		43,620 72	43,620 72
San Joaquin		3,531 20	3,531 20
Preliminary investigation		7,952 48	7,952 48
Totals		$3,048,167 66	$2,424,064 45

Irrigation Districts.

The Wright Act of 1887. Briefly stated this act sought to confer on farming communities powers of municipalities in the purchase or construction and the operation of irrigation works. These powers included the right of eminent domain, the right to issue bonds against all of the real property within any area organized into an irrigation district, and the right to tax that property for the payment of the cost of any irrigation works acquired or built, and of their operation.

Organization of irrigation districts followed quite rapidly after the passage of the Wright Act, which was approved March 7, 1887 (the act was revised in 1897), and before the end of that year, Turlock, Modesto, Orland and Central districts had been formed in the order named. Seven organized in 1888, including Browns Valley, Madera, Alta and Poso; six in 1889, including Tulare, Anaheim, and Escondido; eleven in 1890, including Selma, Rialto and Perris; thirteen in 1891, including Sunset, Tipton, Linda Vista and Otay, and in 1895 they numbered forty-nine. Many of these for various reasons turned out failures. Only eight districts of the forty-nine are now operating.

Up to July 1, 1915, fifty-seven irrigation districts have been organized in California since 1887, of which nine have been formed since the passage of the act of 1897. Counting eight of the old districts—Browns Valley, Modesto, Turlock, Alta, Tulare, Little Rock Creek, Big Rock Creek and Walnut—seventeen out of the fifty-seven are in existence and twelve are operating. Of the remaining five, Big Rock Creek district has just been revised, Anderson, Cottonwood, La Mesa, Lemon Grove and Spring Valley, and Imperial, although fully organized and although they have all voted bonds, have not yet become operating districts, and Waterford and Alpaugh have not yet adopted plans or voted bonds. Since July 1, 1915, West Side, near Tracy, area 11,500 acres; Terra Bella, surrounding Terra Bella, area 12,500 acres; Lindsay-Strathmore, east of Lindsay and Strathmore, area 18,000 acres; Carmichael, near Fair Oaks, area 1,306 acres; South Lassen, near Doyle, area approximately 22,000 acres. The formation of additional districts is, or recently has been, under consideration at Paradise, Thermalito, Oroville, Willows, Princeton, Ione, Morgan Hill, Merced, Madera, Stratton and Cardiff, San Diego County.*

California Irrigation Districts (22).

(February 1, 1916.)

District	County
Anderson-Cottonwood	Shasta
Browns Valley	Yuba
Oakdale	Stanislaus
South San Joaquin	San Joaquin
Waterford	Stanislaus
Modesto	Stanislaus
Turlock	Stanislaus
Alta	Fresno, Tulare, Kings
Tulare	Tulare
Alpaugh	Tulare
Little Rock Creek	Los Angeles
Big Rock Creek	Los Angeles
La Mesa, Lemon Cove and Spring Valley	San Diego
San Ysidro	San Diego
Imperial	Imperial
South Lassen	Lassen
Carmichael	Sacramento
West Side	San Joaquin
Lindsay-Strathmore	Tulare
Terra Bella	Tulare

Private Irrigation Systems.

The following are a few of the most important of the very large number of private systems in various parts of the State:

California Development Company. This company diverts water from the west bank of the Colorado River close to the Mexican border. Its main canal passes through a portion of the Mexican territory of Lower California, where about 100,000 acres are served. It enters the State again at about sea level, and covers about 400,000 acres, mostly below sea level, in the Imperial Valley, of which upward of 225,000 acres are irrigated. The company does not own any of the land, most of which has been taken up under the Desert Land Act.

San Diego Flume Company. This system, which is typical of the coast region of southern California, irrigates about 7,000 acres to the north and east of the city of San Diego from the San Diego River and the storage reservoirs.

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*For further details see Bulletin No. 2, State Department of Engineering, Irrigation Districts in California, 1887–1915, by Frank Adams, Irrigation Manager, U. S. Department of Agriculture.

Riverside Water Company and Gage Canal Company. These two systems serve the valuable lands between the south bank of the Santa Ana River and the hills from the section east of Colton, through the Riverside district, in San Bernardino and Riverside counties, but are in no way connected with each other. The value of the entire system, which includes the municipal supply of Riverside, is estimated at $2,500,000, the irrigating portion alone being valued at nearly $1,000,000.

The Gage Canal Company diverts water from the Santa Ana River; its flow is largely augmented during the summer by numerous artesian wells and pumping plants.

Kern County Land Company. The Kern County Land Company is interested in numerous canal projects and corporations, taking water from both sides of Kern River, irrigating lands in what is called the Kern delta, lying south, west, and southwest of Bakersfield. Of these lands there are about 80,000 acres in alfalfa, 12,000 acres in grain, 10,000 acres in pasture, wild grass, and 15,124 acres in orchards, vines, gardens, etc.

Kern Valley Irrigation Company. The Kern Valley Water Company's canal, belonging to Miller & Lux, irrigates the riparian lands lying between Buena Vista Lake and Tulare Lake. About 63,000 acres of this land are in cultivation, mostly in alfalfa.

Fresno and Consolidated Canals Company. These two systems, although kept separate, are operated by the same people and cover practically all the irrigated lands in Fresno County, amounting to about 360,000 acres. The points of diversion for the various canals are all along the west bank of the Kings River, close to where it enters the valley.

The Consolidated includes the Fowler Switch and the Centerville and Kingsburg canals, as well as a majority of the stock of the Emigrant canal. The latter is on the lower Kings River, and diverts water from the river six miles west to Kingsburg to irrigate lands on the Laguna de Tache Rancho, which belongs largely to this company.

The Consolidated has later priorities on the river, and its flow is cut off from the middle of June to August 1st, so that its rights are not so valuable as the Fresno canal rights. An annual charge is made for the maintenance of the main canals, amounting to 62½ cents per acre under the Fresno and 75 cents per acre under the Consolidated. The lateral ditches are owned and controlled by the irrigators. No measurements are made to users, each irrigator taking what he needs in accordance with the rights held by him. Considering its area, it is the most highly developed district in the State.

The San Joaquin and Kings River Canal and Irrigation Company. This system diverts water from the west bank of the San Joaquin River about 1½ miles north of the town of Mendota, in Fresno County. It it the oldest large canal in the valley, having been organized in February, 1871. The area tributary to it extends for seventy miles along the west bank of the river, in Fresno, Merced, and Stanislaus counties. The company belongs to Miller & Lux, who have riparian rights on the river, and their own lands are very largely included.

The Crocker-Huffman Land and Water Company. The Merced River furnishes the supply for the 220,000 acres irrigable from its canals.

These lands extend from the foothills, near where the river enters the valley, to the country surrounding the city of Merced and between that city and Livingston.

The Butte County and the Sutter County Canals. These two canals are controlled by the same people, using the same main canal, but are separately incorporated. The Butte canal serves the area in Butte County and the Sutter canal serves that in Sutter County. This combined system covers about 80,000 acres, 30,000 in Butte and 50,000 in Sutter County, composed of lands between the Feather River, the Marysville Buttes, and the swamp lands along the Sacramento River south to where the slough which leaves the Feather River near Marysville joins the Sutter basin.

Sacramento Valley Irrigation Company.—This is a recent enterprise, backed by large eastern financial interests, which have secured the rights of the Central Irrigation District by the purchase of all outstanding district bonds for 35 per cent of their par value. They have secured control, also, of 100,000 acres in the above district, and are carrying on extensive work in preparing for the irrigation and drainage of the 225,000 acres which will be included in their system.*

Imperial Valley and the Salton Sea.

The Colorado River is the division line between California and Arizona. It empties into the Gulf of California about sixty miles below Yuma, Arizona. The Colorado has been called the Nile of America, as it is subject to a large rise annually. Its waters have turned the desert lands of Imperial Valley into fertile lands, and more will be reclaimed by the Yuma project of the United States Reclamation Service.

The Salton Sea, or sink, originally formed a part of the Colorado desert, which comprises an area of nearly 2,000 square miles. The desert comprises two fertile valleys, one in Riverside County, known as the Coachella Valley, the other as Imperial Valley, in Imperial County. Salton Sea, which partly fills the sink, lies between the two valleys. On December 31, 1908, its surface was 206 feet below mean sea level, and was nearly 45 miles long and from 9 to 15 miles wide, its maximum depth 67 feet and its area about 443 square miles.

In 1891 the Colorado overflowed into Salton Sink; in 1905 the flood into the sink was repeated on a much larger scale. The old channel of the Alamo River was transformed into a deep, wide gorge, and another channel, now called New River, was formed. Practically all the water received by Salton Sea enters through Alamo and New rivers, but chiefly through the former. These rivers run through Imperial Valley and are drainage channels for waste water from irrigation systems and power plants.

Lakes.

There are several good sized lakes in the northeastern part of the State, namely, Lower Klamath Lake, near Brownell, which has an area of about 21,000 acres; Tule, Clear, Goose, and Upper, Middle and Lower Alkali lakes. All of these are shallow and more or less alkaline. Farther south there are the Eagle and Honey lakes, the water of the latter sweet, and the former rather alkaline.

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*See "Irrigation in California," by F. W. Roeding, United States Department of Agriculture.

South of these is Lake Tahoe, at an elevation of 6,000 feet, with a surface area of about 250 square miles, partly in California and partly in Nevada. It has an average depth of about 1,000 feet, and is the source of the Truckee River.

Mono and Owens lakes, like many others, have no outlet, and are strongly alkaline.

Tulare Lake is a shallow body of water, about thirty miles south of Fresno and forty miles northwest of Bakersfield. In 1852–1854 the area was nearly 1,000 square miles, the lake being full, and about 35 feet deep. The flood of 1867 was the last to fill the lake to overflowing and about 1870 it began to recede, until in 1898 the lake bed became practically dry, brought about by the water being diverted for irrigation and light precipitation for a number of years. After partly refilling in 1901 it became completely dry in 1905, and in the early spring of 1906 was entirely under cultivation. On March 15, 1906, the first water reached the lake bed at the mouth of the Kings River and spread over a large area. A few days later water from Kaweah and Tule rivers reached the lake. On June 1st the water was 7 feet deep and covered about 200 square miles. On June 23d overflow water from Kern basin cut through the sand ridge to the south and flowed into the lake. On August 4th the water reached its greatest height for the year 1906, and the lake had an area of about 300 square miles and a maximum depth of 12.7 feet. The total rise of the lake that year was 10.8 feet. In November, 1907, the lake had an area of about 274 square miles, a depth of about 12.4 feet, and an average length of 20 miles, and a width of 13.5 miles. The lake reached its greatest height in July of 1907, when it had maximum depth in the summer of nearly 14 feet. Since then it has been subsiding, and is about 11 feet deep. It is probable that the lake will continue to fluctuate very much as in the past, but whether it is to fill and subside alternately are questions of great importance.

The sudden reappearance of the lake resulted in the loss of millions of dollars, but permanent reclamation is ultimately hoped for.*

Buena Vista Lake is the outlet of Kern River, and is connected with Tulare Lake by sloughs.

Clear Lake, in Lake County, is the only natural body of sweet water in the Coast Range worthy of consideration. It has a surface area of 64 square miles, and is the source of Cache Creek, which enters the Sacramento River near Woodland.

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*For further valuable details, see Water Supply Paper, Part XI, by W. B. Clapp and F. F. Henshaw, United States Geological Survey.

IRRIGATION RESOURCES OF CALIFORNIA.

(Compiled from the Report of the Conservation Commission of California.)

Summary of Agricultural and Irrigated Areas in Northern California.*

Division	Valley agricultural land, acres	Valley plains, acres	Foothill agricultural land, acres	Areas irrigated, acres
Northern coastal counties	503,000			2,290
North central mountain valleys	435,000			99,910
Northeastern plateaus and valleys	867,000			161,850
Feather River valleys	158,000			50,600
Sierra foothills			789,000	45,250
Sacramento Valley	2,659,000	790,000		123,800
Totals	4,622,000	790,000	789,000	483,700

Summary of Agricultural and Irrigated Areas in Central California.

Division	Valley agricultural land, acres	Valley plains, acres	Foothill agricultural land, acres	Area irrigated, acres
Coastal valleys	887,000			87,000
San Joaquin Valley	6,530,000	1,046,000		1,728,975
Sierra foothills above San Joaquin Valley			730,000	10,620
Lands east of the Sierra Nevada	472,000			137,760
Totals	7,889,000	1,046,000	730,000	1,959,355

Summary of Agricultural, Irrigated, and Estimated Irrigable Lands in Southern California.

Area	Agricultural land, acres	Irrigated land, acres	Estimated area that ultimately will be irrigated, acres
Santa Barbara and Ventura counties	509,250	49,656	322,500
Los Angeles and San Gabriel River lands	441.986	167,454	381,500
Santa Ana River lands	876.671	213,407	279,000
San Diego County	363,668	19,880	87,100
Colorado Desert and River valleys	1,550,750	279,600	766,500
Mojave Desert	2,328,000	15,489	113,000
Totals	6,070,325	745,486	1,949,600

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*For further valuable details, see Water Supply Paper, Part XI, by W. B. Clapp and F. F. Henshaw, United States Geological Survey.

NOTE.—For a full description of irrigated areas in the State and of land that it is possible to irrigate, see Report of the Conservation Commission of California, 1912, which contains a large number of valuable maps; also "Irrigation Resources of California and Their Utilization," by Frank Adams, irrigation manager in charge of work in California. Experiment Station Bulletin 254.

Summary of Areas Irrigated, 1909-1911, Revised to 1912.

Division	Agricultural areas in irrigation zones, acres	Areas irrigated, acres	Total areas it is estimated may ultimately be irrigated, acres	Approximate per cent of total estimated as ultimately irrigable
Northern California	6,200,200	487,805	3,450,000	56
Central California	9,665,000	1,959,355	4,300,000	44
Southern California	6,000,000	745,486	1,949,600	33
Totals	21,865,200	3,192,646	9,699,600	44

Drainage Area in Square Miles, Annual Flow in Cubic Feet of Rivers and Creeks in Sacramento Valley, 1875-1910.

Streams and point of measurement	Number of years	Drainage area, square miles	Mean flow, cubibc feet per second	Total mean annual run-off, acre feet
Sacramento River, Red Bluff	16	9,300	14,300	10,400,000
Sacramento River, Collinsville	7	26,200	35,900	26,000,000
Stony Creek, Fruto	10	600	802	581.000
Feather River, Oroville	9	3,640	8,320	6,020,000
Yuba River, near Smartsville	7	1,220	4,440	3,220,000
Bear River, Van Trent	6	263	574	416,000
Cache Creek, Yolo	8	1,230	960	695,000
Putah Creek, Winters	5	805	712	515,000
American River, Fair Oaks	6	1,910	5,060	3,660,000
Cosumnes River, Michigan Bar	3	524	571	404,000

Drainage Area in Square Miles, Mean and Annual Flow in San Joaquin Valley.*

Rivers, creeks, and measurement at edge of foothills*	Number of years	Drainage area, square miles	Mean flow, cubic feet	Total mean annual run-off, acre feet
San Joaquin River, and north:				
Mokelumne River	12	657	1,380	1,000,000
Calaveras River	6	491	520	377,000
Stanislaus River	18	1,051	1,930	1,400,000
Tuolumne River	21	1,635	2,870	2,080,000
Merced River	15	1,090	1,700	1,228,000
Bear Creek	6	166	65	47,000
Mariposa Creek	6	122	46	33,000
Chowchilla River	6	268	152	110,000
Fresno River	6	272	167	121,000
Upper San Joaquin River	16	1,640	2,850	2,060,000
Totals	11	7,392	11,680	8,456,000
South of San Joaquin River:				
Kings River	23	1,740	2,647	1,920,000
Kaweah River	13	520	736	533,000
Tule River	9	266	204	148,000
Kern River	22	2,345	1,063	770,000
Caliente Creek	6	423	191	138,000
Poso Creek	6	289	128	92,000
White Creek	6	90	40	29,000
Deer Creek	6	110	49	35,000
Totals	11	5,738	5,058	3,665,000
Grand totals	11	13,175	16,738	12,121,000

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*From records of California Engineering Department.

Irrigation From Underground Waters in the Central Coast Valleys and the San Joaquin Valley.

CENTRAL COAST VALLEYS IN 1909.

Counties	Area irrigated from pumped wells, acres*	Area irrigated from flowing wells, acres*
Alameda	1,125	------------
Contra Costa	68	------------
Monterey	4,428	------------
San Benito	1,812	847
San Francisco	383	------------
San Luis Obispo	109	18
San Mateo	1,057	------------
Santa Clara	15,947	7,415
Santa Cruz	247	2
Totals	25,176	8,282

SAN JOAQUIN VALLEY IN 1909 AND 1912.

Counties	Area irrigated by pumping plants, 1909, acres*	Area irrigated from flowing wells, 1909, acres*	Total irrigated from ground waters, 1909, acres*	Area reported irrigated in 1912, acres†
Fresno	21,729	------------	21,729	27,620
Kern	4,290	2,097	6,387	12,240
Kings	1,042	11,400	12,442	30,780
Madera	1,663	------------	1,663	9,300
Merced	2,002	262	2,264	4,680
San Joaquin	8,642	------------	8,642	11,380
Stanislaus	5	------------	5	440
Tulare	31,286	6,556	37,942	75,320
Totals	70,659	20,415	91,074	171,760

*From the Census Reports in 1909. †California Conservation Commission.

NOTE.—The increase for the three years, 1909-1912, in the San Joaquin Valley, has averaged 30 per cent per year.

CALIFORNIA RIVERS AND CREEKS IN 1911.*

(Compiled from the Reports of the U. S. Geological Survey.)

Rivers or creeks, and canals	Drainage area, square miles	Drainage in second-feet		Total run-off	
		Maximum	Minimum	Depth in inches on drainage area	Total in acre-feet
Southern Pacific Ocean Drainage Basins.					
Tia Juana River Basin—					
Cottonwood Creek (and conduit), near Jamul	270	97	.0	----------	4,860
Sweetwater River, near Descanso	40	182	.0	2.57	5,490
San Diego River Basin—					
San Diego River (and flume) at Lakeside	208	660	.0	1.31	14,400
San Dieguito River Basin—					
Santa Ysabel Creek, near Escondido	128	----------	----------	----------	3,410
San Luis Rey River, near Pala	318	----------	----------	----------	31,000
Santa Ana River Basin—					
Santa Ana River, near Mentone and Pacific Light and Power canal	182	1,900	39	9.91	96,500
San Gabriel River and canal, near Azusa	222	9,160	32	23.33	276,000
Los Angeles River Basin—					
Arroyo Seco, near Pasadena	16.4	----------	----------	----------	3,250
Santa Ynez River Basin—					
Santa Ynez River, near Santa Barbara	207	----------	----------	----------	51,500
Santa Ynez River, near Lompoc	725	20,400	30	13.86	537,000
Salinas River Basin—					
Arroyo Seco, near Soledad	215	13,300	11	25.51	292,000
San Francisco Bay Drainage Basins.					
San Joaquin River Basin—					
San Joaquin River, near Friant (formerly Pollasky)	1,640	38,800	297	40.81	3,570,000
Kern River (and power canal) at Isabella	1,220	5,750	245	13.02	846,000
Kern River, near Bakersfield	2,345	4,623	281	8.10	1,010,000
Tule River, near Porterville	266	2,780	14	8.58	122,000
Kaweah River, near Three Rivers	520	6,610	62	19.69	546,000
Kings River, near Sanger	1,740	20,500	270	30.58	2,840,000
Merced River, near Merced Falls	1,090	37,200	100	36.32	2,110,000
Tuolumne River, near Lagrange (and three canals)	1,500	52,600	16	----------	3,380,000
Modesto Canal, near Lagrange	----------	618	.0	----------	184,000
Turlock Canal, near Lagrange	----------	1,030	.0	----------	302,000
Lagrange Water and Power Co.'s canal, near Lagrange	----------	66	.0	----------	43,400
Stanislaus River, Stanislaus Water Co.'s canal and shell ditch at Knight's Ferry	935	36,900	182	46.58	2,320,000
Mokelumne River, near Clements	642	16,700	75	44.29	1,520,000
Cosumnes River at Michigan Bar	524	22,400	24	31.24	874,000
Sacramento River Basin—					
Sacramento River at Antler	461	14,000	245	39.84	979,000
Sacramento River, near Red Bluff (including Goose Lake Basin)	10,400	130,000	5,110	17.27	9,580,000

California Rivers and Creeks—Continued.

Rivers or creeks, and canals	Drainage area, square miles	Drainage in second-feet		Total run-off	
		Maximum	Minimum	Depth in inches on drainage area	Total in acre-feet
San Francisco Bay Drainage Basins—Continued.					
Sacramento River Basin—Cont.—					
Pit River, near Ydalpom (includes Goose Lake drainage basin, 1,090 square miles)	6,350	20,600	3,080	11.91	4,040,000
McCloud River at Baird	665	12,600	1,240	46.45	1,650,000
North Fork of Cottonwood Creek at Ono	52	2,460	5	33.21	92,100
Stony Creek, near Fruto	601	15,400	15	16.20	519,000
Little Stony Creek, near Lodoga	102	4,980	2	17.41	94,800
Feather River at Oroville	3,640	75,400	1,060	25.27	6,850,000
Yuba River, near Smartsville	1,220	39,000	410	53.09	3,460,000
North Fork of Yuba River at Goodyear Bar	214	4,570	120	63.74	727,000
North Fork of North Fork of Yuba River at Downieville	71.2	2,290	42	71.10	270,000
Rock Creek at Goodyear Bar	10.8	545	.5	59.40	34,200
Goodyear Creek at Goodyear Bar	12.2	1,180	3	106.95	69,600
Bear River at Van Trent	263	22,200	23	36.43	510,000
American River at Fair Oaks	1,910	69,100	----------	53.01	5,400,000
Rubicon River, near Quintette	198	3,000	5	37.66	398,000
Little South Fork of Rubicon River at mouth, near Quintette (1909-1911)	57.8	616	2	33.72	104,000
Cache Creek at Lower Lake	500	1,410	3	9.47	252,000
Cache Creek at Yolo	1,230	18,400	.0	7.573	496,000
*Northern Pacific Ocean Drainage Basins.**					

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*This includes the Russian River basin, Mattole Creek basin, Eel River basin, Yager Creek, Van Duzen River, Mad River basin, and Redwood Creek basin, but the records available are not sufficient to enable these details to be given.

In addition to these there are a large number of other rivers and streams, the details of which are not so complete as the above. See Water Supply Paper 311, U. S. Geological Survey, 1912, and Water Supply Paper 300, 1913.

NOTE.—There are four drainage areas in California: The South Pacific Coast area—Tia Juana River, Sweetwater River, San Diego River, San Dieguito River, San Luis Rey River, Santa Ana River, San Gabriel River, Malilu Creek, Santa Ynez River, Santa Maria River, Salinas River; North Pacific Coast area—Russian River, Eel River, Mad River, Klamath River (includes Trinity and Scott rivers); Big Basin area—Susan River, Willow Creek, Truckee River, Owens River; Great Valley area—Sacramento Valley, San Joaquin Valley, San Joaquin River basin, Tulare Lake basin, Kern River basin.

TABLE XXXIII.

Irrigated Farms—Acreage and Cost, 1910.

(Compiled from the Reports of the Bureau of the Census.)

Counties	Number of farms irrigated	Acreage irrigated	Acreage capable of irrigation, 1910	Acreage capable of irrigation in projects	Cost of enterprises to July 1, 1910	Average cost per acre capable irrigation, 1910
Alameda	50	1,859	1,872	2,605	$57,156	$30 53
Alpine	32	3,349	3,399	3,435	7,493	2 20
Amador	73	826	3,973	4,139	265,608	66 85
Butte	556	28,754	115,075	233,500	1,231,894	10 71
Calaveras	154	1,275	3,161	3,919	121,033	38 29
Colusa	112	4,276	16,541	18,783	76,112	4 60
Contra Costa	78	26,856	32,562	32,640	90,503	2 78
Del Norte	----------	----------	----------	----------	----------	----------
El Dorado	244	5,122	5,501	20,264	346,939	63 07
Fresno	5,310	402,318	560,326	633,652	1,898,460	3 39
Glenn	196	5,661	16,804	220,664	1,519,561	90 43
Humboldt	33	208	333	966	29,027	87 17
Imperial	1,250	190,711	242,000	375,000	4,955,272	20 48
Inyo	408	65,163	71,815	92,319	962,698	13 41
Kern	876	190,034	217,418	402,806	1,788,635	8 23
Kings	1,126	190,949	289,523	310,523	687,381	2 37
Lake	43	582	828	1,268	12,124	14 64
Lassen	355	77,079	89,815	149,530	884,965	9 85
Los Angeles	4,669	145,586	183,506	241,794	7,817,023	42 60
Madera	158	38,705	51,230	82,321	512,098	10 00
Marin	6	67	71	71	3,380	47 61
Mariposa	56	376	546	767	13,440	24 62
Mendocino	39	371	590	1,365	30,297	51 35
Merced	1,417	151,998	248,670	281,719	3,748,211	15 07
Modoc	437	82,075	89,476	124,166	301,040	3 36
Mono	76	49,027	50,007	84,973	64,282	1 29
Monterey	258	15,056	27,176	29,914	495,916	18 25
Napa	36	1,191	2,035	2,443	53,948	26 51
Nevada	300	3,839	4,259	5,267	1,569,028	368 40
Orange	2,215	55,056	63,486	71,444	1,948,246	30 69
Placer	618	16,845	23,365	61,751	2,798,740	119 78
Plumas	151	36,602	37,529	37,901	107,118	2 85
Riverside	2,174	71,436	103,233	210,452	5,648,469	54 72
Sacramento	1,053	53,683	69,970	74,588	1,452,471	20 76
San Benito	240	7,186	13,790	20,067	177,924	12 90
San Bernardino	2,463	70,278	86,107	152,415	9,416,960	109 36
San Diego	890	24,944	31,205	45,535	3,753,127	120 27
San Francisco	25	383	383	383	21,975	57 38
San Joaquin	1,452	59,811	77,083	173,563	1,689,720	21 92
San Luis Obispo	91	1,687	2,416	2,539	32,311	13 37
San Mateo	75	3,648	3,653	3,983	90,921	24 89
Santa Barbara	137	12,012	13,572	13,603	307,186	27 28
Santa Clara	1,101	37,637	50,939	60,140	1,337,216	26 25
Santa Cruz	106	1,201	1,313	2,232	76,621	58 36
Shasta	639	33,004	36,564	72,653	430,766	11 78
Sierra	94	17,504	17,505	18,249	69,650	3 98
Siskiyou	636	60,301	66,866	79,161	370,627	5 54
Solano	150	3,610	7,160	8,192	135,532	18 93
Sonoma	38	631	761	951	13,801	18 14
Stanislaus	1,911	84,015	141,785	340,914	4,051,870	28 58
Sutter	39	1,173	1,361	1,959	18,800	13 81
Tehama	366	14,281	23,167	36,020	263,055	11 35
Trinity	201	6,324	7,127	9,513	173,414	24 33
Tulare	3,048	265,404	337,938	466,735	5,634,379	16 67
Tuolumne	157	2,035	2,083	5,958	180,474	84 64
Ventura	489	25,273	49,407	56,357	2,262,205	45 79
Yolo	333	11,754	14,697	55,967	311,660	21 21
Yuba	112	3,073	6,401	46,322	198,268	30 97
Totals	39,352	2,664,104	3,619,378	5,490,360	$72,580,030	av. $20 05

TABLE XXXIV.

Irrigated Farms—Main Ditches, Laterals, Flowing Wells and Pumped Wells, 1910.

Counties	Main ditches		Laterals		Wells	
	Number	Length, miles	Number	Length, miles	Number of flowing wells	Number of pumped wells
Alameda	49	21				56
Alpine	25	34	3	1		
Amador	55	185	12	56		
Butte	135	270	145	170		46
Calaveras	148	124	32	31	6	7
Colusa	38	41	10	7		3
Contra Costa	176	172			1	26
Del Norte						
El Dorado	56	285	25	55		
Fresno	254	831	688	1,354	3	855
Glenn	50	136	554	1,073		105
Humboldt	33	26	4	2		2
Imperial	12	117	179	890		
Inyo	184	396	326	168	10	1
Kern	178	441	118	257	25	140
Kings	27	137	51	159	75	20
Lake	44	26	21	2	1	3
Lassen	295	368	263	116		
Los Angeles	601	800	494	500	376	1,673
Madera	34	79	30	294		33
Marin	5	5				1
Mariposa	49	21				2
Mendocino	33	19	8	6		6
Merced	45	261	353	352	29	78
Modoc	446	637	490	175	45	2
Mono	85	172	101	65		
Monterey	106	223	23	32		102
Napa	26	8	3	3		2
Nevada	110	236	46	32		5
Orange	309	180	115	246	588	580
Placer	35	194	46	108		2
Plumas	147	201	62	16	3	
Riverside	301	500	262	288	553	792
Sacramento	213	238	5	8		1,168
San Benito	64	61	12	33		87
San Bernardino	291	466	237	283	79	449
San Diego	288	259	244	140		438
San Francisco	24	7				39
San Joaquin	298	308	49	192		1,618
San Luis Obispo	51	42	5	3	4	12
San Mateo	57	58				40
Santa Barbara	76	75	4	5	7	113
Santa Clara	458	228	39	27	438	800
Santa Cruz	81	41			2	58
Shasta	446	678	130	81	2	34
Sierra	119	150	4	1		
Siskiyou	595	688	172	41		3
Solano	20	22				125
Sonoma	32	21				11
Stanislaus	23	153	34	274		3
Sutter	13	6				18
Tehama	136	164	41	40	1	141
Trinity	208	228	41	13		1
Tulare	752	1,033	577	629	79	794
Tuolumne	62	153	11	24	2	4
Ventura	148	177	53	87	32	157
Yolo	8	87	8	83		58
Yuba	36	128	13	87		11
Totals	8,590	12,620	6,143	8,590	2,361	10,724

PART VII.

PETROLEUM, NATURAL GAS, MINERALS AND MINERAL SPRINGS.

Petroleum by Counties and Fields. Production 1890-1914. Production in Other States. World's Output. Imports and Exports. Natural Gas. Minerals 1904-1914. Mineral Springs.

PRODUCTION OF PRINCIPAL MINERALS—1904-1914.

Value of Principal Minerals, Value by Counties, Mineral Springs in California.

PETROLEUM.*

The existence of petroleum in California has long been known. The native Indians used it in the form of asphaltum for various purposes, and it was utilized by the Catholic fathers for roofing their missions and other buildings. For nearly half a century Russia was the largest producer of petroleum in the world, but now occupies the second place, the first being held by California.

Duration of Oil Fields.

The National Conservation Committee in 1908 estimated the petroleum area in California as 850 square miles, and the natural gas area as 310 square miles.

A vast system of pipe lines has been constructed from the various fields to the coast. In 1913 there were 27 pipe lines and branches in operation. The total pipe-line carrying capacity at the end of 1913 was as follows:

	Barrels
Daily capacity of San Joaquin Valley	191,000
Daily capacity of Santa Maria system	100,000
Daily capacity of Santa Clara Valley system to Ventura	3,500
Daily capacity of pipe lines from Los Angeles and Puente Hills districts to Los Angeles city and harbor	106,800
Daily carrying capacity of all lines in California	401,300

Petroleum Reserves in California.

Two reserves of public lands have been established to assure the Navy a supply of oil in case of need. These reservers are in Elk Hills and the Buena Vista Hills, Kern County. The public lands within these areas have been withdrawn from all forms of entry during the last few years, and in 1912 a special reservation for naval purposes was made.

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*For the early development of California oil fields, see Report for 1913, pages 176 177, and 1914, pages 162–167.

California Largest Producer.

California still maintains the lead as the largest producer of petroleum in the United States. In the world's production the United States has been first for many years, and Russia which was formerly first, now occupies the second place. In 1914, the production in the United States was 265,762,535 barrels, and Russia 67,020,522 barrels.

The estimated production of the United States in 1915, is 267,400,000 barrels. As a result of the over-production in 1914, the field activity in California was reduced to the lowest practicable minimum in 1915, the estimated production being about 89,000,000 barrels. The number of new oil wells drilled in California during 1915 was only about 240, as compared with 400 drilled in 1914.

Production and Value of Oil by Counties.

(From the California State Mining Bureau.*)

County	1913		1914	
	Barrels	Value	Barrels	Value
Fresno	18,956,965	$7,927,736	15,952,190	$7,210,389
Kern	58,698,432	27,038,474	65,332,633	26,721,046
Los Angeles	4,143,690	2,672,680	3,558,690	1,957,279
Orange	9,485,362	6,867,402	12,758,678	8,612,108
Santa Barbara	6,291,076	3,151,725	4,325,787	1,989,862
Santa Clara	20,000	12,000	10,000	5,300
Ventura	899,007	907,997	943,929	991,125
Totals	98,494,532	$48,578,014	102,881,907	$47,487,109

*For further details regarding the production by fields and counties see Report of State Board of Agriculture, 1914, pages 162–167.

Average Price of Oil by Counties.

County	1913	1914	Inc. + Dec. —
Fresno	41.8¢	45.2¢	+3.4
Kern	46.0¢	40.9¢	—5.1
Los Angeles	64.5¢	55.0¢	—9.5
Orange	72.4¢	67.5¢	—4.9
Santa Barbara	50.0¢	46.0¢	—4.0
Santa Clara	60.0¢	53.0¢	—7.0
Ventura	101.0¢	105.0¢	+4.0
State average	49 3¢	46.1¢	—3.2

Production by Fields.

(Barrels 42 gallons.)

Field	1913	1914	Inc. + Dec —
Kern River	10,499,509	7,227,422	—3,222,087
McKittrick	4,520,549	3,871,352	—649,197
Midway-Sunset	39,277,370	49,408,493	+10,131,123
Lost Hills-Belridge	5,272,630	4,825,366	—447,264
Coalinga	18,696,110	15,952,190	—2,743,920
Santa Maria—Lompoc	4,843,683	4,266,387	—577,296
Ventura County-Newhall	1,009,633	943,929	—65,704
Los Angeles-Salt Lake	2,942,684	2,456,937	—485,747
Whittier-Fullerton	10,685,146	13,860,431	+3,175,285
Summerland	59,400	59,400	—
Watsonville	20,000	10,000	—10,000
Totals	97,776,714	102,881,907	+5,105,193

Well Operation by Fields, 1914.

Field	Producing Dec., 1913	Producing Dec., 1914	Increase	Decrease	Completed	Abandoned
Kern River	1,397	1,385	--------	12	15	2
McKittrick	254	251	--------	3	9	5
Midway-Sunset	1,214	1,376	162	--------	206	12
Lost Hills-Belridge	185	240	55	--------	49	10
Coalinga	867	815	--------	52	30	11
Santa Maria-Lompoc	221	235	14	--------	6	2
Ventura-Newhall	409	442	33	--------	35	3
Los Angeles-Salt Lake	682	687	5	--------	9	8
Whittier-Fullerton	514	568	54	--------	62	2
Summerland	122	102	--------	20	--------	--------
Watsonville	5	5	--------	--------	--------	--------
Totals	5,870	6,106	236	--------	421	55

SUMMARY.

Production of Petroleum in California, 1890-1915.

Year	Barrels of 42 gallons	Value
1890	307,360	$384,200
1891	323,600	401,264
1892	385,049	561,333
1893	470,179	608,092
1894	783,078	1,064,521
1895	1,245,339	1,000,235
1896	1,257,780	1,180,793
1897	1,911,569	1,918,269
1898	2,249,088	2,376,420
1899	2,677,875	2,660,793
1900	4,329,950	4,152,928
1901	7,710,315	2,961,102
1902	14,356,910	4,692,189
1903	24,340,839	7,313,271
1904	29,736,003	8,317,809
1905	34,275,701	9,007,820
1906	32,624,000	9,238,020
1907	40,311,171	16,783,943
1908	48,306,910	26,566,181
1909	58,191,723	32,398,187
1910	73,010,560	35,749,473
1911	78,195,139	40,552,088
1912	90,073,202	43,000,000
1913	98,494,532	48,578,014
1914	102,881,907	47,487,109
1915 (estimated)	89,725,000	39,030,712

The estimates of the output do not always agree, as some authorities include the quantity used in the field, which amounts to about 5,000,000 gallons annually.

Of the fourteen states now producing petroleum, the date of first production was as follows:

State	Year	Barrels
Pennsylvania and New York	1859	2,000
California	1876	12,000
West Virginia	1876	120,000
Ohio	1876	31,763
Kentucky and Tennessee	1883	4,755
Colorado	1887	76,295
Indiana	1889	33,375
Illinois	1889	1,460
Kansas	1889	500
Texas	1889	48
Missouri	1889	20
Oklahoma	1891	30
Wyoming	1894	2,369
Louisiana	1902	548,617

Exports of Petroleum From the United States.

The quantity of oil exported from the United States is enormous, and has increased from 967,262,000 gallons in 1900 to 2,034,826,481 gallons in 1915, and the value has increased during this period from $68,247,000 to $128,781,641.

Imports of Petroleum in 1900-1914.

Year	Free gallons	Value	Dutiable gallons	Value
1900	2,354,720	$217,405	19,509	$3,042
1910	13,693,228	609,400	*2,156	644
1911	38,775,884	2,143,661	----------	----------
1912	160,502,114	3,654,453	----------	----------
1913	529,737,973	9,216,980	----------	----------
1914	791,137,399	13,665,940	----------	----------
1915	662,185,502	9,790,932	----------	----------

*From July 1st to August 5th. All mineral oils became free on August 6, 1909. Note the enormous increase of 369,235,859 gallons in 1913, after being placed on the free list.

IMPORTS AND EXPORTS OF PETROLEUM IN 1914-1915.

Imports.

	1914		1915	
	Gallons	Value	Gallons	Value
Crude	773,052,480	$11,776,737	653,707,517	$8,918,096
Benzine, gasoline, and naphtha	16,139,912	1,400,740	7,920,504	762,556
All others	1,945,007	488,463	557,481	110,280
Totals	791,137,399	$13,665,940	662,185,502	$9,790,932

Exports of Domestic Petroleum.

	1914		1915	
	Gallons	Value	Gallons	Value
Mineral, crude, including all natural oils, without regard to gravity	146,477,342	$6,812,672	152,514,129	$4,911,634
Refined or manufactured—				
Illuminating oil	1,157,283,310	$74,500,162	886,316,740	$53,607,082
Lubricating and heavy paraffin oil	196,884,696	27,852,959	214,429,099	28,499,786
Naphthas and all lighter products of distillation:				
Gasoline	151,611,537	21,699,475	156,860,666	17,603,317
All other	40,840,730	5,653,210	94,335,128	10,296,928
Residuum, tar, and all from which the light bodies have been distilled:				
Gas oil and fuel oil	475,143,205	13,747,863	672,981,878	18,543,976
All others	113,370,245	1,907,715	9,952,970	230,552
Totals	2,135,133,723	$145,361,384	2,034,826,481	$128,781,641

It may be noted that although the production of petroleum in this country has developed into such huge quantities, the imports are quite considerable and increasing.

NATURAL GAS AND GASOLINE.

Since 1889, when natural gas was first produced and used in California, the natural gas industry has become of great importance, and to the United States belongs the credit of making natural gas a commercial product.

Since the discovery of gas in the Buena Vista Hills, near Taft, in Kern County, the natural gas industry of California has continued to improve.

In 1913 the pipe line from the midway field to southern California was completed at a great cost, and natural gas was introduced into Los Angeles and other towns and cities in the adjacent territory.

It is estimated that 11,034,597,000 cubic feet of gas, valued at $1,883,450, or 17.07 cents per thousand cubic feet, was produced in this State and consummed in 1913, as compared with 9,354,428,000 cubic feet valued at $1,134,456, or 12.13 cents per thousand cubic feet in 1912. The wells with greatest capacity and highest pressure are located in Kern County, where at the close of 1913 there were 27 gas wells, which range in depth from 1,600 to 2,782 feet, and have a pressure of from 250 to 960 pounds. Considerable gas is produced from the oil wells of Orange and Santa Barbara counties, where it is largely used for field purposes, and as this gas is very rich in gasoline, several plants have been installed in these counties for the production of gasoline, which has become an important industry of this State, the production in 1913 being second only to Oklahoma. The counties in which gas is produced are: Humboldt, Kern, Orange, Los Angeles, Sacramento, San Joaquin, Santa Barbara, Santa Clara, Solano, Tehama, Ventura, and Fresno. The number of productive gas wells in the State at the close of 1913 was 72. The value of gas as here shown is open to considerable question but is certainly not too high. The average price is about 6 cents per 1,000 cubic feet. Seven thousand cubic feet of gas is about equal to one barrel of oil in heating value.

Natural Gas, 1914.

County	M. cu. ft.	Value
Fresno	250,000	$15,000
Humboldt	--------------	150
Kern	6,508,868	390,532
Kings	150	500
Los Angeles	1,250,000	75,000
Orange	1,867,336	112,040
Sacramento	80,000	40,000
San Joaquin	154,872	25,900
Santa Barbara	6,313,380	378,802
Solano	5,357	5,546
Ventura	100,000	6,000
Totals	16,529,963+	$1,049,470

Natural Gas Produced in California, 1900-1914.

Year	Value
1900	$79,083
1901	67,602
1902	120,648
1903	104,521
1904	114,195
1905	133,696
1906	134,560
1907	168,397
1908	307,652
1909	446,933
1910	476,697
1911	800,714
1912	1,134,456
1913	1,883,450
1914	1,049,470

Gasoline.

The marketed gasoline extracted from natural gas in California in 1914 amounted to 7,581,309 gallons, valued at $633,517, an increase of 4,120,562 gallons, or 119 per cent, in quantity and of $257,290, or 68 per cent, in value over the production credited to the State in 1913. The average price received for the output in 1914 was 8.36 cents a gallon, as compared with 10.87 cents in 1913, the decline in this respect being less in California than in the Appalachian and Mid-Continent States because of the fact that the California product is wholly absorbed by local markets, where competition with gasoline derived from crude petroleum is less keen than in the states east of the Rocky Mountains.

The gasoline plants of this State are situated for the most part in the Coastal and Southern fields, though one plant is operated at Coalinga and another at Taft in the San Joaquin Valley field. The industry is most active in the Santa Maria field, Santa Barbara County, where a total of 8 plants contributed more than 55 per cent of the output credited to the State in 1914. The output of casinghead gasoline in this county increased from 1,953,643 gallons in 1913 to 4,225,334 gallons in 1914, the latter quantity being greater than the output credited to the entire State in 1913.

Marketed Production of Gasoline From Natural Gas in California in 1914, by Counties.

County	Plants		Gasoline produced	
	Number in operation	Daily capacity, gallons	Quantity gallons	Value
Santa Barbara	8	16,378	4,225,334	$323,701
Orange	4	10,609	2,403,059	222,334
Los Angeles	4	1,839	570,104	59,453
Fresno	1	3,534	382,812	28,029
Ventura	1			
Kern	1			
Totals	19	32,360	7,581,309	$633,517

MINERALS.

California is rich in minerals, but as yet comparatively little has been done, with the exception of gold mining, and in more recent years in the petroleum fields, to develop its vast resources. The great difficulty in the way of opening up some of these valuable deposits is the want of transportation facilities.

Borax, magnesite, and chrome production in the United States come solely from California. Eighty per cent of the domestic supply of quicksilver and platinum is mined in this State. California leads all other states in the Union in the value of petroleum and gold produced; is first of all states west of the Mississippi in the value of her total mineral production, and is only outranked by a few of the great iron and coal producing states of the East. The value of the total mineral output for 1914 is estimated at $93,436,553.

In 1914 there were forty-two different mineral substances, and of the 58 counties all but Alpine and Sutter, contributed some mineral product. The total value was less than that of 1913 by $5,208,086, owing to general depression in business. The mineral products which fell off most, were petroleum, cement, copper, and stone of various sorts. The decrease in the price of oil caused a decrease in total value, but there was an increase in the amount produced.

Total Gold Production of California, 1909-1914.*

Gold is more widely distributed than any other substance thus far mined in California, thirty counties out of the fifty-eight in the State showing a gold yield in 1914 and gold is known to exist in several others. Gold was discovered by James W. Marshall, on January 24, 1848, at Sutter's Mill, near Coloma, El Dorado County. The value of the gold produced since that year, until 1914 amounts to about $1,608,862,904.

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*The complete Output and Value of Minerals for 1915 has not yet been issued.

The following summaries are compiled from the reports of the State Mining Bureau:

SUMMARY OF SOME OF THE LEADING MINERAL PRODUCTS.

Gold, 1894-1914.

Year	Value	Year	Value
1894	$13,923,281	1905	$19,197,043
1895	15,334,317	1906	18,732,452
1896	17,181,562	1907	16,727,928
1897	15,871,401	1908	18,761,559
1898	15,906,478	1909	20,237,870
1899	15,336,031	1910	19,715,440
1900	15,863,355	1911	19,738,908
1901	16,989,044	1912	19,713,478
1902	16,910,320	1913	20,406,958
1903	16,471,264	1914	20,775,000
1904	19,109,600		

Nevada and Amador each produced gold of a value exceeding $3,000,000 in 1914, Sacramento being third with a production of $2,175,000.

Silver, 1904-1914.

Year	Value	Year	Value
1904	$873,525	1910	$993,646
1905	678,494	1911	673,336
1906	817,830	1912	799,584
1907	751,646	1913	832,553
1908	873,057	1914	814,230
1909	896,250		

The total value of silver obtained 1887-1914 is estimated at $22,864,314. The average price for the year 1914 was 54.8 cents per ounce, in 1915 it rose to 75 cents, but in May, 1916, had fallen to 66 cents.

Silver is found in thirty-three counties, Shasta being the leading producer, and Inyo County second.

Quicksilver, 1904-1915.

Year	Flasks	Value	Year	Flasks	Value
1904	28,876	$1,086,323	1910	17,665	$799,002
1905	24,655	886,081	1911	19,109	879,205
1906	19,516	712,334	1912	20,600	866,024
1907	17,379	663,178	1913	15,661	630,042
1908	18,039	763,520	1914	11,373	557,846
1909	16,217	773,788	1915	12,450	*1,068,210

NOTE.—Flasks contain 75 pounds since June 1, 1904. Average price in San Francisco, $40.23 per flask, as compared with $42.04 in 1912. In January, 1915, the price was $51.90 per flask, and in December, $123.00. In the early part of 1916 the price advanced to $275.00 and $300.00, but has since fallen heavily.

*Estimated.

Ten counties reported a production of quicksilver during 1914. California supplies about 80 per cent of the quicksilver production in the United States. San Benito County is much the largest producer, followed by Santa Clara and San Luis Obispo.

Copper, 1904-1914.

Year	Pounds	Value	Year	Pounds	Value
1904	29,974,154	$3,969,995	1910	53,721,032	$6,680,641
1905	16,997,489	2,650,605	1911	36,838,024	4,604,753
1906	28,726,448	5,522,712	1912	34,169,997	5,638,049
1907	32,602,945	6,341,387	1913	34,471,118	5,343,023
1908	40,868,772	5,350,777	1914	30,491,535	4,055,375
1909	65,727,736	8,478,142			

Copper was produced in sixteen counties in 1914, Shasta being by far the largest, producing more than two-thirds of the amount.

Platinum, 1904-1914.

Year	Ounces	Value	Year	Ounces	Value
1904		$1,849	1910	337	$8,386
1905	200	3,320	1911	511	14,873
1906	91.46	1,647	1912	603	19,731
1907	300.07	6,255	1913	368	17,738
1908	706	13,414	1914	330	14,800
1909	416	10,400			

The leading counties in the production of platinum are Butte, Del Norte, and Sacramento.

Gems, 1904-1914.

Year	Value	Year	Value
1904	$136,000	1910	$237,475
1905	148,500	1911	51,824
1906	497,090	1912	23,050
1907	232,642	1913	13,740
1908	208,950	1914	3,970
1909	193,700		

Gems are found in eight counties, San Diego County as a rule being the largest producer.

Asphalt (Refined), 1904-1914.

Year	Tons	Value	Year	Tons	Value
1904	56,187	$672,910	1910	184,967	$2,125,122
1905	40,304	285,290	1911	180,000	2,250,000
1906	77,756	777,560	1912	250,000	2,500,000
1907	79,718	1,058,400	1913	344,000	2,752,000
1908	105,443	1,082,376	1914	259,972	2,057,725
1909	136,664	1,707,159			

There are forty-eight refineries in the State, mostly located near the oil fields.

Bituminous Rock, 1904-1914.

Year	Tons	Value	Year	Tons	Value
1904	45,280	$175,680	1910	87,547	$165,711
1905	24,753	60,436	1911	75,125	117,279
1906	16,077	45,204	1912	44,073	87,467
1907	24,122	72,835	1913	37,541	78,479
1908	30,718	109,818	1914	66,119	166,618
1909	34,123	116,436			

The only counties which produce bituminous rock are: Santa Cruz, 40,540 tons; Santa Barbara, 25,000 tons; San Luis Obispo, 579 tons.

Coal, 1904-1914.

Year	Tons	Value	Year	Tons	Value
1904	79,062	$376,494	1910	11,033	$23,484
1905	46,500	144,500	1911	11,047	18,297
1906	24,850	61,600	1912	14,848	39,092
1907	23,734	55,849	1913	25,198	85,809
1908	18,496	55,503	1914	11,859	28,806
1909	49,389	216,913			

The quality of the coal is not high, most of it being lignite. Amador, Contra Costa, Monterey, and Siskiyou counties are the only producers.

Borax, 1904-1914.

Year	Pounds	Value	Year	Pounds	Value
1904	91,294,000	$698,810	1910	33,656,000	$1,177,960
1905	97,068,000	1,019,158	1911	50,945,000	1,456,672
1906	116,346,000	1,182,410	1912	42,135,000	1,122,713
1907	106,825,000	1,200,913	1913	58,051,000	1,491,530
1908	44,400,000	1,117,000	1914	62,500,000	1,483,500
1909	33,257,000	1,163,960			

California is the only State in America producing borax. Most of the deposits are in the desert portions of California, located largely in Inyo, Kern, Riverside, Imperial, and San Bernardino counties.

Salt, 1904-1914.

Year	Tons	Value	Year	Tons	Value
1904	95,968	$187,300	1910	174,920	$395,417
1905	77,118	141,925	1911	173,332	324,255
1906	101,650	213,228	1912	185,721	383,370
1907	88,063	310,967	1913	204,407	462,681
1908	121,764	281,469	1914	223,806	583,553
1909	155,680	414,708			

Salt is produced by ten counties, Alameda being the largest producer, with 126,983 tons; San Mateo, 27,500 tons; Kern and Los Angeles about 20,000 tons each, and San Diego, 15,300 tons.

Magnesite, 1904-1914.

Year	Tons	Value
1904	2,850	$9,298
1905	3,933	16,221
1906	4,032	40,320
1907	6,405	57,720
1908	10,582	80,822
1909	7,942	62,588
1910	16,570	113,887
1911	8,858	67,430
1912	10,512	105,120
1913	9,632	77,056
1914	11,438	114,380

Magnesite is found in Tulare, Fresno, Riverside, and Santa Clara counties.

TABLE XXXV.

Production of Minerals, 1912-1914.

(From the California State Mining Bureau.)

Substance	1912	1913	1914	
			Amount	Value
Asbestos	$2,700	$1,175	51 tons	$1,530
Barytes	2,812	3,680	2,000 tons	3,000
Bituminous rock	87,467	78,479	66,119 tons	166,618
Borax	1,122,713	1,491,530	62,500 tons	1,483,500
Brick	2,940,290	2,915,350	270,791 M	2,288,227
Cement	6,074,661	7,743,024	5,109,218 bbls.	6,558,148
Chromite	11,260	12,700	1,517 tons	9,434
Clay	215,683	261,273	179,948 tons	167,552
Coal	39,092	85,809	11,859 tons	28,806
Copper	5,638,049	5,343,023	30,491,535 lbs.	4,055,375
Feldspar	6,180	7,850	3,530 tons	16,565
Fuller's earth	6,500	3,700	760 tons	5,928
Gems	23,050	13,740	----------	3,970
Gold	19,713,478	20,406,958	----------	†20,775,000
Graphite	----------	25	----------	----------
Gypsum	117,388	135,050	29,734 tons	78,375
Infusorial earth	17,074	35,968	12,840 tons	80,350
Iron ore	2,508	4,485	1,436 tons	5,128
Lead	61,653	160,202	4,697,400 lbs.	183,198
Lime	464,440	528,547	439,961 bbls.	378,663
Limestone	570,248	274,455	572,272 tons	517,713
Magnesite	105,120	77,056	11,438 tons	114,380
Manganese	400	----------	150 tons	1,500
Marble	74,120	113,282	25,436 cu. ft.	48,832
Mineral paint	1,800	1,780	132 tons	847
Mineral water	529,384	599,748	2,443,572 gals.	476,169
Natural gas	940,076	1,053,292	16,529,963 M cu. ft.	1,049,470
Petroleum	41,868,344	48,578,014	102,881,907 bbls.	47,487,109
Platinum	19,731	17,738	330 oz.	†14,800
Potash	----------	----------	10 tons	460
Pumice stone	2,500	4,500	50 tons	1,000
Pyrites	203,470	218,537	79,267 tons	230,058
Quartz rock	----------	7,756	2,500 tons	4,800
Quicksilver	866,024	630,042	11,373 flasks	557,846
Salt	383,370	462,681	223,806 tons	583,553
Sand-glass	15,404	14,143	26,038 tons	17,888
Sandstone	22,574	27,870	111,691 cu. ft.	45,322
Silver	799,584	832,553	----------	†814,230
Soapstone	7,350	6,150	1,000 tons	4,500
Soda	37,094	24,936	6,522 tons	115,396
Stone, miscellaneous*	5,473,928	6,168,020	----------	4,860,357
Tungsten ore	206,000	234,673	4,830 tons	180,575
Zinc	298,866	64,845	399,641 lbs.	20,381
Totals	$88,972,385	$98,644,639	----------	$93,436,553
Asphalt	2,500,000	2,752,000		
Total, including asphalt	$91,472,385	$101,396,639		

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*Including granite, macadam, rubble, paving blocks, sand and gravel.
†Estimated.

TABLE XXXVI.

Value of Minerals Produced by Counties, 1912-1914, also Number of Mineral Springs.

(From the California State Mining Bureau.)

County	1912	1913	1914	Number of mineral springs†
Alameda	$794,961	$844,217	$870,427	6
Alpine	*	541	-----------	1
Amador	2,925,202	3,013,180	3,230,075	-----------
Butte	2,403,675	2,533,940	1,755,315	3
Calaveras	2,051,781	2,042,901	2,068,343	1
Colusa	70,165	48,481	32,251	12
Contra Costa	829,811	1,962,640	1,149,321	8
Del Norte	3,950	2,514	5,270	-----------
El Dorado	122,001	67,723	150,086	5
Fresno	8,897,685	8,438,810	7,484,231	9
Glenn	32,950	27,776	30,553	3
Humboldt	268,116	471,052	233,574	5
Imperial	30,000	95,054	239,140	8
Inyo	483,330	1,942,309	2,091,362	36
Kern	23,097,003	28,406,193	28,047,957	26
Kings	1,850	1,335	740	-----------
Lake	123,286	125,829	63,503	56
Lassen	-----------	2,382	4,324	19
Los Angeles	5,594,513	5,833,298	4,665,504	14
Madera	112,285	371,867	203,517	10
Marin	122,200	278,453	554,137	4
Mariposa	214,294	246,079	187,870	4
Mendocino	300	9,450	560	35
Merced	45,000	35,329	‡112,500	-----------
Modoc	29,187	6,875	1,730	18
Mono	454,268	184,428	17,150	20
Monterey	132,749	178,679	113,831	8
Napa	266,708	1,186,353	971,748	14
Nevada	2,108,543	2,950,367	3,329,179	1
Orange	4,518,275	6,948,495	8,831,763	2
Placer	881,537	520,808	1,099,743	12
Plumas	196,997	143,698	164,809	16
Riverside	782,627	2,071,969	1,579,586	23
Sacramento	2,171,399	2,925,706	2,632,658	-----------
San Benito	494,068	514,995	436,259	1
San Bernardino	1,428,057	2,486,100	1,614,606	44
San Diego	305,683	315,694	315,267	19
San Francisco	151,147	110,551	119,889	-----------
San Joaquin	210,040	165,157	129,930	-----------
San Luis Obispo	31,564	63,675	63,465	12
San Mateo	216,582	215,371	246,478	-----------
Santa Barbara	4,111,258	3,636,288	2,686,309	7
Santa Clara	557,585	311,383	266,956	12
Santa Cruz	270,207	1,816,805	1,642,958	3
Shasta	5,825,819	6,212,344	5,044,930	16
Sierra	736,423	1,010,976	733,000	2
Siskiyou	598,713	309,986	384,752	28
Solano	203,073	1,839,721	1,683,866	2
Sonoma	346,306	239,037	326,144	21
Stanislaus	295,673	272,249	‡5,882	2
Sutter	-----------	-----------	-----------	-----------
Tehama	1,300	2,442	300	11
Trinity	733,755	435,142	753,745	4
Tulare	142,890	119,760	161,252	18
Tuolumne	1,353,706	1,198,383	1,059,118	1
Ventura	595,399	924,972	1,000,729	9
Yolo	-----------	-----------	736	-----------
Yuba	2,775,132	2,507,139	2,820,895	-----------
Unapportioned	7,821,357	17,738	16,330	-----------
Totals	$88,972,385	$98,644,639	$93,436,553	591

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*Alpine included in Stanislaus.
†From report of U. S. Geological Survey.
‡Includes gold and silver, the production of Stanislaus.

CALIFORNIA MINERAL SPRINGS.*

There are a very large number of valuable mineral springs in California, which contain the same curative properties as the most famous spas of Europe, but they are not so widely known as they deserve. Among these are to be found alkaline, carbonated, chalybeate, epsom salts, saline, sulphur, soda, vichy, cold, warm, and hot, and also hot mud springs. There are 591 springs in California, some of which consist of several separate springs, and of these 119 are spring resorts.†

Mineral waters are generally divided into four classes: Acidulous, sulphurous, chalybeate, and saline.

In the production of mineral waters California ranked first in 1914. The State also ranked fourth in number of commercial springs and third in value of output. These figures refer to mineral water actually bottled and sold, and are produced in twenty-two counties situated in all parts of the State.

Half of California mineral water is reported to be sold for table use. There are resorts at twenty-three of the larger springs with accommodation for nearly 4,800 patrons, and the water at seventeen springs is used for bathing. Spring owners reported a total of 46,000 gallons of water used for the manufacture of soft drinks.

Production and Value of Mineral Waters in California, 1908-1914.

Year	Commercial springs	Quantity sold, gallons	Value	Price per gallon received at springs, cents
1908	40	1,960,770	$393,920	20.1
1909	44	2,179,187	444,230	20.4
1910	41	2,008,697	394,841	19.7
1911	40	2,310,237	578,439	25.0
1912	41	2,089,951	532,971	26.0
1913	49	2,801,393	531,925	19.0
1914	48	2,443,572	476,169	22.0

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*For a list of mineral springs in the State, see Report of State Board of Agriculture, 1914, pages 176–178.

†Eleven counties—Amador, Del Norte, Kings, Merced, Sacramento, San Francisco, San Joaquin, San Mateo, Sutter, Yolo, and Yuba—have no springs. The largest number is 56, in Lake County, followed by San Bernardino with 44, Inyo 36, and Mendocino 35.

PART VIII.

CALIFORNIA FORESTS. THE LUMBER INDUSTRY. MANUFACTURES.

NATIONAL FORESTS.

Grazing Permits; Ownership of Forests by Counties; Forest Fires; National Monuments; Lumber Industry—Lumber Cut, 1905-1912, Value of Lumber, 1850-1909.

MANUFACTURES.

Summary of Fourteen Leading Manufactures; Manufacturing Industry, 1900-1909, and 1914; Manufactures of Twenty-one Leading Cities.

The total area within the boundaries of the twenty National Forests wholly or partly in California January 1, 1916, was 24,940,249 acres, of which 19,532,731 acres were public lands. This is larger than the area of National Forests in any other State in the Union, Idaho and Montana ranking next, with 17,719,972 and 16,104,734 acres, respectively. The area in California by Forests, with the name of the Forest headquarters, is shown by the following table taken from the reports of the Forest Service, U. S. Department of Agriculture:

Area and Location of National Forests.

Forest	Area of National Forest land	Area of other lands within National Forest boundaries	Total area within National Forest boundaries	Date of latest proclamation	Forest headquarters (post office)
Angeles	887,964	271,699	1,159,663	May 27, 1913	Los Angeles.
California	822,137	240,485	1,062,622	Oct. 12, 1910	Willows.
Cleveland	549,569	283,675	833,244	Aug. 31, 1915	Escondido.
Crater*	51,263	9,837	61,100	July 19, 1915	Medford, Oreg.
Eldorado*	549,350	286,450	835,800	July 28, 1910	Placerville.
Inyo*	1,252,288	85,492	1,337,780	Feb. 23, 1911	Bishop.
Klamath*	1,471,017	260,329	1,731,346	June 21, 1912	Yreka.
Lassen	1,013,143	383,815	1,396,958	Dec. 30, 1910	Red Bluff.
Modoc	1,182,817	400,042	1,582,859	Dec. 23, 1910	Alturas.
Mono*	801,514	81,636	883,150	June 30, 1911	Gardnerville, Nev.
Monterey	438,765	63,000	501,765	Dec. 12, 1910	King City.
Plumas	1,147,556	286,004	1,433,560	Nov. 17, 1914	Quincy.
Santa Barbara	1,698,008	237,036	1,935,044	June 9, 1915	Santa Barbara.
Sequoia	2,194,952	272,683	2,467,635	July 1, 1915	Hot Springs.
Shasta	828,205	758,675	1,586,880	June 19, 1912	Sisson.
Sierra	1,495,066	170,414	1,665,480	Apr. 27, 1915	Northfork.
Siskiyou*	349,772	52,023	401,795	May 4, 1914	Grants Pass, Oreg.
Stanislaus	822,269	288,366	1,110,635	Apr. 13, 1915	Sonora.
Tahoe*	546,630	660,156	1,206,786	July 28, 1910	Nevada City.
Trinity	1,430,446	315,701	1,746,147	June 7, 1912	Weaverville.
Totals	19,532,731	5,407,518	24,940,249		

*Forest in two states. Area given is for California only.

The total area within the boundaries of the National Forests was decreased in 1911 by presidential proclamation, which eliminated 4,598,705 acres and added 2,806,267 acres. While it will doubtless be necessary in the future to make small additions and eliminations from time to time, as conditions change, it is believed that the boundaries now established or planted may be regarded as fairly stable.

California	Acres
Gross area, June 30, 1910	24,940,249
Eliminations	1,045,861
Alienated area	5,407,518
Net area, December 31, 1915	19,532,731

About $883,000 is spent annually in administering and protecting the National Forests in California. During the fiscal year ending June 30, 1915, permanent improvements, including 230 miles of trails and 428 miles of telephone lines, were built at a cost of $93,398. The Government Forest systems now aggregate 3,271 miles of trails and 4,067 miles of telephone lines.

Each National Forest is under the immediate control of a Forest Supervisor. For purposes of administration and protection, the Forests are divided into ranger districts, each in charge of a District Ranger. Under the District Rangers are the protection forces, Lookouts, Patrolmen and Forest Firemen. The lookouts, stationed upon high peaks, report fires to the District Ranger by telephone or heliograph.

Rangers, Patrolmen and Firemen employed by the Forest Service in California during the summer of 1915 totaled 555, with fire detection service performed by 85 lookout men. In addition, about 500 men—mountaineers, miners and lumbermen—were registered with the Forest Service as volunteers to be called out in emergencies. Eighty Patrolmen, paid by private owners of timber within the Forest, worked under the supervision of and in co-operation with the Forest Service. During the fiscal year of 1915, about $40,000 was contributed by railroads, lumber companies, municipal organizations, counties, and private citizens for fire protection, and spent through co-operative agreements with the Forest Service on 4,000,000 acres of timber land and valuable watersheds.

Although in 1915, a season of great fire hazard, a total of 1,525 fires were reported and extinguished, the damage done within the National Forests of the State was but $7,374, a sum far less than the average for previous years.

Forest Fires in California, 1906-1915.

Year	Number of fires	Area burned, acres	Damage, value
1906	120	650,000	------------
1907	305	75,060	$8,601
1908	572	163,216	103,259
1909	638	357,269	600,000
1910	553	367,344	407,569
1911	797	66,508	51,083
1912	998	156,241	31,906
1913	1,971	559,370	511,077
1914	1,565	122,636	263,160
1915	1,525	------------	7,374

Since the chief purposes in establishing the National Forests were watershed protection and the conservation of a public timber supply, they were necessarily established in mountainous regions. Lands valuable for agriculture, mining and other uses foreign to the above purposes were included only incidentally and unavoidably and occur in scattered and more or less isolated areas. The mineral lands are subject to location, entry and patent under the mining laws applicable to the public domain, and the agricultural lands are subject to acquisition under the Forest Homestead Law. Congress has authorized and directed the Secretary of Agriculture to select, classify and segregate all lands within the National Forests that may be opened to settlement and entry under the Forest Homestead Law.

The result of land classification to January 1, 1916, is shown by the following table:

Land Classification Projects in California, December 31, 1915.

Forest	Project	Total area classified, acres	Agricultural under present conditions, acres	Agricultural after removal of timber, acres
Angeles	Cajon	143,333	382	------
	Tujunga	164,836	997	------
	1915	857,131	9,586	------
Cleveland	Laguna	23,115	------	------
	Oak Grove	56,920	11,265	------
	1915	806,044	2,926	------
Lassen	Hat Creek	91,675	1,410	6,745
Santa Barbara	Santa Clara	394,229	6,946	------
	Ventura	725,739	8,566	------
Sequoia	Sequoia	2,113,180	81,429	------
Shasta	Cayton	23,080	------	------
	Henderson	13,785	------	530
	Dulaney	12,390	------	2,950
	McCloud Flats	35,760	740	7,550
	Red Rock	24,430	1,100	640
	Sisson	16,000	1,160	------
	Trinity Center	38,400	263	------
Sierra	Sierra	1,665,480	2.502	340
Totals	------	7,205,527	129,272	18,755

While this table shows the relative proportion of agricultural land to be very small, it being only about 2.05 per cent of the area so far examined, the total area made available for agricultural use is considerable. Classification is now under way on several million acres and it will be carried on until the entire National Forest areas are covered. The classification records are open to the public and the agricultural land is taken up by homesteaders about as fast as it is classified.

The National Forest administrative act contains authority for allowing the use of National Forest lands and resources as fully as may be consistent with the accomplishment of the main purposes of watershed protection and timber conservation. Probably the most important of such uses in California is the development of hydroelectric power. In 1915 ten permits were issued for a total of 114,346 h.p. at minimum stream discharge. In all fifty-two permits are in force for a total of 460,000 h.p. at minimum stream discharge. The total capacity of machinery now installed in operating plants is 265,420 h.p.

Permits for other uses to a total 3,726 are in force. Among the more important of these are summer residences, hotels, resorts, stores, apiaries, pastures, drift fences, telephone lines, water conduits, and reservoirs.

The privilege of grazing stock upon the National Forests is allowed where it does not interfere with the purposes for which they were established.

Of the 19,532,731 acres, approximately 12,350,000 only are used or partially used for grazing purposes, the balance of the area being unused on account of no forage value, inaccessibility, poisonous plants, lack of water or areas closed to grazing for the protection of municipal water supply, to prevent damage to forest growth, or for other public uses, and areas available but not applied for. A large proportion of the present unused areas will be made usable in co-operation with the stockmen by the development and improvement of watering facilities, the construction of trails and drift fences and the revegetation of depleted areas.

The following table shows the number of grazing permits granted during the years 1911 to 1915 and the number and kind of stock grazed upon the National Forests in California:

Grazing Permits, 1911-1915.

Year	Number of permits	Cattle, number	Horses, number	Hogs, number	Number of permits	Sheep and lambs	Number of goats
1911	2.422	151,582	9,824	3,867	298	372,646	13,464
1912	2,521	169,361	10,403	3,480	367	432,974	15,235
1913	2,664	169,951	11.765	2,360	377	438,556	13,249
1914	2,696	175.356	12.487	1,608	348	424,917	10,956
1915	2,694	176,616	10,383	1,644	317	392,271	6,644

This table shows an increase between 1911 and 1915 in the number of permits issued and in the number of stock, notwithstanding the fact that approximately 3,000,000 acres of principally grazing lands were eliminated from the Forests during those five years.

To reduce loss of live stock on the National Forest ranges, the Forest Service in co-operation with the United States Biological Survey and the stockmen, has taken an active part in the destruction of predatory animals. The following table shows the number of such animals killed by Forest officers in the years 1910 to 1915, inclusive:

Predatory Animals Destroyed, 1910-1915.

Animal	1910	1911	1912	1913	1914	1915	Total
Bears	73	37	12	6	28	38	194
Mountain lions	23	5	3	3	--------	7	41
Wolves	2	7	2	--------	6	16	33
Coyotes	903	743	478	337	419	337	3,217
Wildcats	309	193	160	132	91	101	986
Lynxes	37	15	2	2	--------	10	66
Totals	1,347	1,000	657	480	544	509	4.537

In the National Forests of California there are about 109,000,000,000 feet of timber, principally pine, fir and cedar, having an estimated value of $200,000,000. Much of this timber is at present inaccessible but will come on the market with the increase of California's population and the more intensive development of her resources.

The amount and value of timber sold, and cut under sales in National Forests in California in the fiscal years 1911 to 1915 is shown by the following table:

Timber Sold and Cut in National Forests, 1911-1915.

Year	Timber sold, board feet	Value	Timber cut under sales, board feet	Value
1911	112,438,000	$295,536 22	37,899,000	$80,243 65
1912	109,214,000	232,697 81	43,914,000	97,239 33
1913	1,064,804,000	2,324,936 03	52,419,000	108,708 74
1914	79,706,000	153,171 54	48,598,000	105,467 99
1915	32,251,000	61,647 59	35,841,000	78,400 33
Totals	1,398,413,000	$3,067,989 19	218,671,000	$470,060 04

In addition to the timber cut under sale, about eight million feet are cut annually under free permit.

In the timber-sale policy of the Forest Service, provision is first made for local needs, present and future, and sale of timber which will enter into the general markets is considered only when it is clear that an excess over the permanent supply required by local industries exists. The number of timber sales, classified according to size of sale, is shown by the following table:

Number of Timber Sales, 1911-1915.

Amount	Number				
	1911	1912	1913	1914	1915
Under $100	506	575	555	682	861
From $100 to $500	24	37	24	16	9
From $500 to $1000	2	9	5	11	8
From $1000 to $5000	6	12	14	10	3
Over $5000	5	2	9	4	2
Total number of sales	543	635	607	723	883

Residents and miners may obtain $20 worth of timber from National Forests for their own use free of charge. The material given away is restricted largely to trees that should be removed for the benefit of the Forest. Free use is also granted liberally for co-operative and public enterprises. Additional timber may be purchased in any amount by farmers and settlers for use on farms and homesteads at actual cost of sale administration. The amount and value of timber cut under free use during the years 1911 to 1915 are shown by the following table:

Free Use of Timber, 1911-1915.

Year	Number of permits	Board feet	Value
1911	3,085	9,197,000	$17,359 02
1912	2,756	8,490,000	14,797 95
1913	3,118	8,918,000	18,011 15
1914	2,915	8,416,000	15,250 47
1915	3,106	6,778,000	16,996 78
Totals	14,980	41,799,000	$82,415 37

The receipts from the National Forests in California are principally from timber sales and rental charges on account of water power and other uses of National Forest lands and resources. Twenty-five per cent of these receipts is paid annually by the United States to the State to be expended for roads and schools in the counties containing National Forest lands. In addition to this, 10 per cent of the total receipts is expended by the Forest Service for the construction of roads and trails where most needed by communities within or adjacent to the National Forests. The amounts paid to the State of California for the fiscal years 1910 to 1915 are shown by the following table:

Amounts Paid to the State, 1910-1915.

Year	Amount	Year	Amount
1910	$60,752 91	1914	$74,541 55
1911	53,716 87	1915	67,611 87
1912	62,052 82		
1913	74,541 00	Total, 1910 to 1915	$393,216 02

Reforestation, 1911-1915.

Year	Sown acres	Planted acres	Total
1911	2,659	169	2,828
1912	632.69	188.60	821.29
1913	133.16	276.77	409.93
1914	5.15	224.09	229.24
1915	22.49	40.80	63.29

Of the standing timber in this State a very large percentage is now in private ownership, the total acreage amounting to 4,555,941.

Ownership of Forests.

County	Acres	County	Acres
Alpine	3,270	Plumas	224,717
Amador	17,903	Riverside	4,784
Butte	89,737	San Benito	2.960
Calaveras	68,663	San Bernardino	10,940
Del Norte	109,600	San Diego	23,469
El Dorado	96.820	San Luis Obispo	2,040
Fresno	19,983	Santa Barbara	160
Glenn	16,796	Santa Cruz	19,956
Humboldt	486,950	Shasta	429,512
Kern	8,600	Sierra	134,176
Lake	10,320	Siskiyou	693,180
Lassen	244,434	Sonoma	162.474
Madera	23,176	Tehama	126.358
Marin	11,597	Trinity	333.840
Mariposa	35,073	Tulare	33.378
Mendocino	475,318	Tuolumne	131.378
Modoc	265,317	Ventura	803
Mono	15,320	Yuba	19,400
Monterey	81,518		
Nevada	60,101	Total	4,555,941
Placer	156,949		

THE LUMBER INDUSTRY.

The wooded land of the State is estimated to have an area of 44,700 square miles, or 22 per cent of the total area of the State. Most of the timber in this area is found upon the Sierra Nevada range and upon the Coast ranges north of San Francisco Bay. A little is found in the Coast ranges farther south, and in those of southern California. The principal species are redwood and yellow pine, with smaller amounts of sugar pine, Douglas fir, and incense cedar.

Redwood is the only important kind of lumber, the production of which is limited to one State. California has no competitor in its production, nor can it ever have, since there is no commercial supply of redwood timber elsewhere. This species is found in a narrow strip stretching from the Oregon line southward, closely bordering the coast, nearly to Monterey Bay. In this strip, comprising some 2,000 square miles, there is estimated to be 80,000,000,000 feet of redwood in a pure forest. This is probably the most dense forest, as measured by the amount of timber per acre, in the world. Lumbering is carried on mainly about Humboldt Bay, at Crescent City, near the Oregon line, and at various points in Mendocino County.

Yellow pine is found along the entire length of the Sierra Nevada and in the Coast ranges. It occupies in the Sierra a well-defined belt which, in the southern part of the range, is limited by a contour 3,000 feet above sea level, while northward it gradually descends, coming down to about 1,500 feet in the upper Sacramento Valley. Its upper limit is on an average about 6,500 feet, above which it is succeeded by species which are fitted to a colder climate. Throughout its range at higher elevations, it occurs with sugar pine in the average proportion of about three of the former to one of the latter. The forest also contains varying amounts of incense cedar and of Douglas fir. The composition of the forests in the northern part of the Coast ranges is quite similar to that in the Sierra, excepting that the proportion of Douglas fir is somewhat greater.

Scattered about in the yellow pine forests, on the slope of the Sierra Nevada, at altitudes ranging from 4,000 to 6,000 feet, are ten groves, differing greatly in size, of *Sequoia gigantea,* the big tree. These trees range in height up to 325 feet, and in diameter to a little over 30 feet. The Big Trees do not occur in pure stands but are intermingled with yellow and sugar pine, firs and cedar.

Lumbering is one of California's most important industries. Its principal products are lumber, laths, shingles and shakes. The amount of lumber manufactured annually in the eleven years 1905 to 1915 is shown in the following table:

Lumber Cut or Manufactured, 1905-1915.

Year	Thousand feet, board measure	Year	Thousand feet, board measure
1905	1,077,499	1911	1,207,561
1906	1,348,599	1912	1,203,059
1907	1,345,943	1913	1,183,383
1908	996,115	1914	1,154,368
1909	1,143,507	1915	1,119,628
1910	1,254,826		

Laths, shingles and shakes were manufactured in 1915 in the amounts as follows:

Laths	38,284,000
Shingles	200,755,000
Shakes	6,628,000

Lumber Cut by Species by 136 Mills in 1915.

Kind of wood	35 mills sawing 10,000M and over	8 mills sawing 5,000M to 10,000M	15 mills sawing 1,000M to 5,000M	15 mills sawing 500M to 1,900M	58 mills sawing 50M to 500M	Total
Douglas fir	100,078	11,845	1,900	1,511	2,346	117,951
Western pine	329,123	28,824	20,016	5,290	6,384	389,991
Redwood	399,553	7,644	8,972	1,215	1,440	418,824
Spruce	9,477					9,477
Cedar	9,213	2,554	84	151	183	12,185
Hemlock	4,537					4,537
Sugar pine	107,641	4,677	772	860	544	114,494
White fir	46,067	2,877	742	516	518	50,720
Oak*	6			790	6	802
Birch*				120		120
Jenisero*				5		5
Spanish cedar*				52		52
Eucalyptus					200	200
Totals	1,005,665	58,421	32,486	10,510	11,621	1,119,628

*Imported in the log.

During the ten years, 1899 to 1909, the output of rough lumber in California increased 55.1 per cent and that of laths 183.4 per cent, while the production of shingles decreased 11.7 per cent. The period of most rapid growth in the industry was from 1899 to 1904, when the output of lumber increased 46.2 per cent. The woods which supply the raw material are almost exclusively conifers, the hardwood cut in 1909, practically all of which was California or tanbark oak, forming only one-fifth of 1 per cent of the total lumber production during the year. A total of 521,630 thousand feet, board measure, or more than 45.6 per cent of the lumber output in 1909, was California redwood, a species of timber which does not occur in saw-log size outside of California. Chief among the other species sawed into lumber in 1909 were western pine, with a production of 364,748 thousand feet, board measure; Douglas fir, with a production of 88,852 thousand feet; sugar pine, with a production of 88,822 thousand feet. The manufacture of shingles, while carried on to some extent in connection with that of lumber, nevertheless amounts practically to a separate industry. Over 88 per cent of the shingle output of the State for 1909 was manufactured from redwood, which timber possesses in very high degree the qualities most desirable in shingle material.

The term ''white fir'' is used as a designation for two or three firs of the Rocky Mountains and the Pacific coast. The lumber produced from them in no way resembles that of the Douglas fir, which, botanically, is not a fir at all.

The average value per thousand feet at the mill was $13.10, the average for individual states ranging from $10.20 in Oregon to $14.01 in California.

In the production of redwood, yellow pine, sugar pine, and white fir, California holds the first place.

Sugar Pine. The commercial range of this great giant of the white pine family is confined almost entirely to the regions of the Sierra in California, where 91.4 per cent of the total cut of 97,191,000 feet was produced in 1909. The output was 81.5 per cent greater than in 1899. The average value of the product per thousand feet in 1909 was 36 cents greater than in 1908, but $1.70 less than in 1907.

California Tanbark and Tanning Extract in 1909.

Description	Tons	Cost	Average cost per ton
Oak bark	36,005	$714,146	$19 83
Myrobalan nuts	620	20,470	33 02
All others	495	10,152	20 51
Totals	37,120	$744,768	$20 06

The average cost per ton in 1909, $10.31, was 73 cents more than in 1908. The highest average cost per ton was reported by California, $20.06. In the total quantity of bark, etc., used in 1909, eleven out of the twenty-one states showed gains over 1908, the greatest being 9,605 tons in California.

The lumber industry includes three distinct operations, which are in some cases carried on by the same organization, in others separately:

1. The logging industry, including the felling of timber, cutting it into lengths, and transporting it by rail or river or flume to the mill.

2. The sawmill industry, in which the raw material consists of saw-logs, the product of the lumber camps; the finished product of rough lumber, including beams, joists, scantling, boards, shingles, laths, etc.

3. The planing mill industry, in which the raw material consists of rough lumber and the finished product planed lumber, with such minor manufactures as are carried on in connection with these mills. In the United States this industry ranks fourth among the greatest manufacturing industries of the country, being exceeded in value of products only by iron and steel, the textile, and the slaughtering and meat-packing industries.

The ten largest holdings of timber lands comprise 2,448,094 acres, or approximately 42 per cent of all the privately-owned timber and cut-over land in the State. They are as follows:

Owners	Acres
Central Pacific Railroad Company (S. P.)	921,311
T. B. Walker and associates	673,665
McCloud River Lumber Company	232,063
Diamond Match Company	159,499
Hammond Lumber Company	94,760
Union Lumber Company	80,350
L. E. White Lumber Company	79,540
Weed Lumber Company	71,458
C. A. Smith	69,768
Sierra Nevada Wood and Lumber Company	65,680

The Southern Pacific holding is the greatest in the United States—106,000,000,000 feet. It is difficult to give an adequate idea of its immensity. It stretches practically 680 miles along that railroad, between Portland and Sacramento. The fastest train over this distance takes thirty-one hours. During all that time the traveler is passing through lands a large portion of which, for 30 miles on each side belongs to the railroad, and in almost the entire strip this corporation is the dominating owner of both timber and land.

The holdings under 2,000 acres are too numerous to publish, but they are summarized as follows:

Size of holdings	Number of holding	Amount in acres		Total
		Timber	Cut-over	
Below 1,000 acres	1,087	460,093	79,071	539,164
1,000 to 2,000 acres	196	195,687	59,321	255,008
2,000 acres and over	286	4,081,794	947,494	5,029,288
Totals		4,737,554	1,085,886	5,823,440

MANUFACTURES.*

Although agriculture and mining are the principal industries in California, the State shows a marked growth in manufactures during the last forty years. The gross value of products per capita of the total population increased from $119 in 1869 to $223 in 1909.

The natural resources of the State give rise to several of its leading industries, such as the lumber industry, canning and preserving, flour milling and gristmilling, petroleum refining, the refining of beet sugar, the wine industry, and the manufacture of cement.

The high cost of fuel, the greater part of which had to be brought from outside of the State, retarded the early development of manufactures, but the development of the oil fields, and the utilization during recent years of electricity generated by water power have given a decided impetus to manufactures in California.

The statistics of manufactures do not include the United States Navy Yard at Mare Island, which in 1909 employed an average of 1,917 wage-earners, and the value of the work performed was $4,335,000.

The most important manufacturing industries are as follows:

Lumber and Timber Products. This industry embraces logging operations, sawmills, planing mills, and establishments engaged in the manufacture of wooden packing boxes. It does not include mills engaged exclusively in custom sawing. The industry is the leading one in the State, giving employment in 1909 to 22,935 wage-earners, or 19.9 per cent of the total for all manufacturing industries, and the value of its products amounted to $45,000,000, or 8.5 per cent of the total.

The lumber industry is one of the seasonal industries. The number of wage-earners in January, the month of minimum employment, was 14,585 less than the number in July, the month of maximum employment.

Slaughtering and Meat-Packing. This classification includes the wholesale slaughtering and meat-packing establishments and those engaged in the manufacture of sausage only. The animals slaughtered are largely cattle and sheep from the foothills and lower mountain slopes and from the plateau region of the northeastern part of the State and southeastern Oregon, conditions in these sections being very favorable to stock raising. About half of the stock slaughtered is raised within the State. The fact that within recent years the meat packers have been able to overcome, through refrigeration, climatic difficulties, which required the excessive use of preservatives in salt meats, has been an important factor in the growth of this industry. The total value of products reported for the industry in 1909, $34,280,000, represents an increase of $18,463,000, or 116.7 per cent, as compared with the amount reported for 1899.

Canning and Preserving. This classification includes the canning of fruits and vegetables, fish, oysters, clams, etc., the preparation of pickled, smoked, and dried fish, the packing of dried fruits by packing houses which make a specialty of such business, and the manufacture of pickles, preserves, jellies, sauces, etc., but it does not include the drying and packing of fruits by the grower on the farm, nor does it include the canning of meats, soups, and similar products in meat-packing establishments (the statistics for which are included with those for the slaughtering and meat-packing industry). The canning, pickling, smoking and drying of fish and the canning of oysters, form comparatively unimportant branches of the industry. California far exceeds any other state in the value of products for this industry, the amount reported for 1909 being $32,915,000, or 21 per cent of the total for the United States. Canning and preserving is a seasonal industry, giving employment to a large number of persons in July, August, September, and October, and to a comparatively small number during most of the other months of the year. The number of wage-earners employed in the industry varied from 2,781 in February to 16,047 in August.

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*The statistics of manufactures for the year 1914 are now in course of publication by the Census Bureau. A brief summary of those issued to date, are given in the County Section, page 275.

Foundry and Machine Shop Products. This industry embraces, in addition to the general class of foundries and machine shops, establishments engaged in such special lines as the manufacture of gas machines and gas and water meters, hardware, plumbers' supplies, steam fittings and heating apparatus, and structural ironware. It does not, however, include establishments which manufacture distinctive products covered by other classifications, such as cash registers and calculating machines, or electrical machinery, apparatus, and supplies. This industry ranked third among the manufacturing industries of the State in 1909 in number of wage-earners, giving employment to 8,377, or 7.3 per cent of the total for all industries.

Flourmill and Gristmill Products. The statistics for all merchant mills grinding wheat, rye, buckwheat, corn or other grains are included in this classification. It does not, however, include factories making fancy cereals or other food preparations as a chief product, or mills doing custom grinding exclusively. The industry shows an increase of $12,143,000, or 93.1 per cent, in value of products during the decade 1899-1909.

Printing and Publishing. This classification includes job printing, the printing and publishing of books, newspapers and periodicals, and music, bookbinding, steel engraving, and lithographing. The 1,240 establishments reporting, included 705 publishing newspapers and periodicals and 481 doing book and job work exclusively. The average number of wage-earners employed in the newspaper and periodical branch of the industry was 3,650, and the value of products $15,239,000; the average number of wage-earners engaged in book and job work was 2,907, and the value of products, $7,438,000. These two branches of the industry together employed 86.8 per cent of the average number of wage-earners, and reported 90.6 per cent of the total value of products for the entire industry in 1909.

Cars and General Shop Construction and Repairs by Steam Railroad Companies. This industry represents the work done in the car shops, but does not cover minor repairs in roundhouses. It is seventh in importance as measured by value of products, and shows a remarkable development for the ten-year period. In 1909 the industry gave employment to an average of 9,342 wage-earners, the second largest number reported for any manufacturing industry in the State, and the value of the work amounted to $18,719,000.

Petroleum Refining. The refining of petroleum has made remarkable progress in the State during the last few years, the value of the products of the industry in 1909 being $17,878,000, or over twenty-five times as great as in 1899, when it was only $698,000.

Butter, Cheese and Condensed Milk. This industry, which in California is confined chiefly to the manufacture of butter, has made marked progress during the past decade, the value of products increasing from $3,583,000 in 1899 to $12,761,000 in 1909, a gain of 256.2 per cent. The manufacture of cheese and condensed milk decreased materially during the period 1904-1909.

Leather, Tanned, Curried and Finished. The tanning, currying and finishing of leather did not become prominent in California until about 1861. From that time, however, it grew rapidly, and since 1877 the local supply of hides and skins has not been large enough to satisfy the requirements of the industry, so that it has been necessary to supplement it by hides and skins brought in from other states or imported from foreign countries.

Malt Liquors. This industry shows considerable growth for the decade, being greater, however, for the five-year period, 1899-1904, than for the following five-year period.

Wines. The extensive vineyards of California have placed the State far ahead of any other in the wine industry. In 1909 the value of the products for the industry in the State, $8,937,000, represented 68.1 per cent of the total for the United States.

Gas, Illuminating and Heating. The manufacture of gas is notable in California, because of the extensive use of petroleum. On account of the lack of coal in the State, the product of the gas plant has been limited to the manufacture of carbureted water gas and oil gas. According to the statistics for 1909, the production of oil gas greatly exceeds that of carbureted water gas. The total value of products reported for the industry in 1909 was $8,927,000, an increase of $5,765,000, or 182.3 per cent over that for 1899.

Cement. California has numerous beds of soft limestone and clay which are relatively low in magnesia and which are being utilized to a considerable extent for the manufacture of Portland cement. In 1904 there were four establishments engaged in the industry, employing 596 wage-earners and reporting products valued at $1,601,000, while in 1909 the industry had increased to eight establishments, giving employment to an average of 2,407 wage-earners and reporting a product valued at $6,504,000. The counties in which the industry is most extensively carried on, named in order of importance, are Solano, Santa Cruz, and San Bernardino.

The Automobile Industry. This industry, which in California had its beginning but a short time prior to 1904, shows a very high rate of increase, the value of products in 1909 being more than forty times as great as in 1904.

Engines and Power. The following shows the number of engines or other motors, according to their character, employed in generating power (including electric motors operated by purchased current) and their total horsepower in 1899 and 1909. The more general use of gas engines is shown, there being 765 such engines, with an indicated capacity of 10,115 horsepower, in 1909, as against 545 engines with 3,244 horsepower in 1899.

Water wheels show a decrease in number but an increase in total horsepower. The figures also show that the practice of renting electric power is increasing rapidly, 35.4 per cent of the total power being rented electric power in 1909, as against 7.6 per cent in 1899. The proportion for 1909 is larger than for any other state in the Union. The use of electric motors for the purpose of applying the power generated within the establishments is rapidly becoming more common, the horsepower of such motors having increased from 6,138 in 1899 to 27,147 in 1909.

Fuel. Of the fuel consumed in generating this power, a notable fact is the large amount of oil and the small amounts of nearly all other kinds of fuel used. The larger part of this oil is crude oil used as fuel in the generation of steam power, but increasing quantities of refined oil are being used in internal-combustion engines.

Anthracite coal, tons	4,421
Bituminous coal, tons	43,165
Coke, tons	113,665
Wood, cords	76,323
Oil, including gasoline, barrels	8,883,015
Gas, 1,000 feet	302,548

MANUFACTURING IN CALIFORNIA, 1900-1909.

The growth of manufacturing in California has made rapid progress, as is shown by the following summary :*

	1900	1909
Number of establishments	12,582	7,659
Capital invested	$205,395,025	$537,134,000
Average number of wage-earners	91,047	115,296
Total salaries and wages	$47,425,947	$107,097,000
Cost of materials used	$188,125,602	$325,238,000
Value of products	$302,874,761	$529,761,000

*For statistics of the years 1850-1890, see Report for 1913, page 214.

Summary of Manufacturing Establishments.

(From the Report of the Census Bureau.)

	Number or amount	
	1889	1909
Number of establishments	4,997	7,659
Persons engaged in manufacture	*	141,576
Proprietors and firm members	*	8,077
Salaried employees	6,877	18,203
Wage-earners (average number)	77,224	115,296
Primary horsepower	126,953	329,100
Capital	$175,468,000	$537,134,000
Expenses	$225,404,000	$476,154,000
Services—		
Salaries	$7,495,000	$22,955,000
Wages	39,890,000	84,142,000
Totals	$47,385,000	$107,097,000
Materials	$164,894,000	$325,238,000
Miscellaneous	13,125,000	43,819,000
Value of products	257,386,000	529,761,000
Value added by manufacture (value of products less cost of materials)	92,492,000	204,523,000

*Figures not available.

Laundries. Statistics for steam laundries are not included in these tables, or in the totals for manufacturing industries. In 1909 there were 321 such establishments in California, 87 of which were in San Francisco, 41 in Oakland, 31 in Los Angeles, and 10 in Sacramento.

The following statement summarizes the statistics:

Number of establishments	321
Persons engaged in the industry	9,060
Proprietors and firm members	308
Salaried employees	714
Wage-earners (average number)	8,038
Primary horsepower	8,961

Capital	$6,295,915
Expenses	8,177,759
Services	5,260,743
Material	1,612,112
Miscellaneous	1,304,904
Amount received for work done	9,541,795

Fourteen Leading Manufactures.

Industry	Number of establishments	Persons engaged*	Salaries	Wages	Capital	Value of product
Automobiles	41	589	$71,000	$368,000	$701,000	$1,470,000
Butter, cheese and condensed milk	161	918	202,000	466,000	2,829,000	12,761,000
Canning and preserving	196	8,714	1,080,000	3,454,000	18,316,000	32,915,000
Cars and steam railway shop construction and repairs	42	9,688	379,000	8,394,000	4,721,000	18,719,000
Cement	8	2,521	195,000	1,650,000	24,014,000	6,504,000
Flour mill and grist mill products	125	1,392	514,000	732,000	13,424,000	25,188,000
Foundry and machine shops	543	10,218	1,832,000	7,312,000	28,693,000	26,731,000
Gas, illuminating and heating	74	2,538	824,000	1,408,000	47,075,000	8,927,000
Leather, tanned, curried and finished	40	1,547	215,000	988,000	8,535,000	9,367,000
Malt liquors	83	1,626	545,000	1,391,000	18,804,000	9,319,000
Wines	181	1,691	429,000	682,000	20,189,000	8,937,000
Lumber and timber products	644	25,079	2,237,000	15,651,000	55,165,000	45,000,000
Petroleum, refining	29	1,146	367,000	801,000	13,881,000	17,878,000
Printing and publishing	1,240	12,215	3,829,000	6,432,000	17,198,000	25,032,000
Slaughtering and meat packing	94	2,135	550,000	1,307,000	11,463,000	34,280,000

*Includes proprietors and firm members, salaried employees, and wage-earners.

Manufactures of Twenty-one Cities with a Population of Ten Thousand and Over, According to Their Relative Industrial Importance.

(From the Report of the Census Bureau.)

	Capital		Average number of wage-earners		Value of products	
	1899	1909	1899	1909	1899	1909
San Francisco†	$69,643,000	$133,824,000	32,555	28,244	$107,023,567	$133,041,069
Los Angeles	10,045,000	59,518,000	5,173	17,327	15,133,696	68,586,274
Oakland	5,173,000	19,113,000	2,476	6,905	5,368,258	22,342,926
Sacramento	6,856,000	10,097,000	3,686	4,514	9,494,633	13,976,911
Stockton	4,454,000	8,250,000	1,185	1,594	5,525,391	11,849,252
Fresno	1,435,000	4,933,000	819	1,938	2,752,201	11,090,195
San Jose	2,980,000	3,815,000	1,221	1,430	3,291,641	5,610,427
San Diego	990,000	5,326,000	255	1,071	669,682	4,740,990
Berkeley	456,000	3,465,000	211	1,084	651,286	4,435,374
Eureka	*	3,306,000	*	946	*	3,011,682
Bakersfield	*	1,791,000	*	746	*	2,818,744
Alameda	749,000	3,002,000	372	915	1,335,326	2,554,417
Vallejo	*	1,559,000	*	203	*	1,895,562
Pasadena	313,000	1,347,000	177	499	330,578	1,724,364
San Bernardino	*	1,242,000	*	729	*	1,659,705
Riverside	*	1,102,000	*	267	*	1,177,962
Santa Barbara	*	895,000	*	265	*	1,169,195
Santa Cruz	*	2,605,000	*	274	*	1,161,269
Long Beach	*	1,326,000	*	277	*	927,180
Pomona	*	630,000	*	224	*	559,661
Redlands	*	1,104,000	*	147	*	518,320

*Figures not available.

†The remarkable increases shown for Alameda and Berkeley, and also for Oakland, are doubtless due largely to the influx of population and business from San Francisco following the earthquake in 1906.

Engines and Power.

Power	Number of engines or motors		Horsepower		Per cent distribution of horsepower	
	1899	1909	1899	1909	1899	1909
Owned:						
Steam	2,158	2,520	105,190	193,526	82.9	58.8
Gas	545	765	3,244	10,115	2.6	3.1
Water wheels	171	115	4,680	7,390	3.7	2.2
Water motors	*	47	*	280	*	0.1
Other			1,609	30	1.3	*
Totals	2,874	3,447	114,723	211,341	90.4	64.2
Rented:						
Electric	*	10,802	9,624	116,537	7.6	35.4
Other			2,606	1,222	2.1	0.4
Totals	2,874	14,249	12,230	329,100	100.0	100.0
Electric motors:						
Run by current generated by establishment	281	1,591	6,138	27,147	38.9	18.9
Run by rented power	*	10,802	9,624	116,537	61.1	81.1
Totals	281	12,393	15,762	143,684	100.0	100.0

*Not reported.

PART IX.

MISCELLANEOUS.

TRANSPORTATION BY WATER; RIVER TRAFFIC.

The Sacramento River—Flood Control; Navigability of the Sacramento River; Traffic on the Sacramento, San Joaquin and Mokelumne Rivers. California Fisheries: Quantity and Value of Salmon; Salmon Rivers; Salmon Catch by Counties; Monterey Sardines; California Oysters; Catch of Fish in 1915; Canned Fish in 1915. Game: Deer; Antelope; Mountain Sheep; Bear; Wild Ducks and Geese; Quail; Grouse; Sage-hen; Doves and Pigeons; Pheasants and Wild Turkeys. Public Roads: Mileage of Roads by Counties. Motor Vehicles.

TRANSPORTATION BY WATER.*

The largest volume of unused water in California comes from the Sacramento and San Joaquin valleys, and it is here that the greatest development in the future will take place. It is not believed that this increased use of water will seriously injure navigation interests, because a large percentage of the water diverted will return to the streams as waste seepage.

The complete utilization of these two rivers will give California the largest rural population of any state in the Union. Whatever expenditure is necessary to protect navigation interests and enable this to be brought about should be made. Even if it requires the construction of locks and the canalizing of both streams, the improvements will be well worth their cost, and as it is a recognized field for the expenditure of government appropriations, a proper presentation of the situation should prove successful. The above is the opinion of such a high authority as Prof. Elwood Mead.

San Francisco Bay, which has an area of about 450 square miles, is by far the most important harbor of the State.

The Sacramento and San Joaquin Valleys.

The greater portion of the arable section of California is comprised in an immense valley about 400 miles long and 40 miles wide. It is inclosed on the east and west by the Sierra Nevada and Coast Range mountains, respectively. The two converge above Red Bluff in the north, while the southern boundary is formed by the Tehachapi Range, joining the Coast Range and the Sierra Nevada below Bakersfield. On the earlier maps of the United States Geological Survey this valley is called "The Great Interior Valley." To-day it is known in its northern part as the Sacramento and in its southern part as the San Joaquin Valley, the first containing about 3,000,000 acres and the latter about 7,000,000 acres. There is no distinguishable dividing line between the two, though the Cosumnes River is usually accepted as such line.

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*See Supplemental Report on Flood Control of the Sacramento River, submitted by Mr. Curry, House of Representatives, House Report No. 616.

The upper portion of the Great Valley is drained by the Sacramento River, flowing south, and the lower portion by the San Joaquin, flowing north. The two rivers have a common delta, and their main streams, flowing on opposite sides of Sherman Island, empty side by side into Suisun Bay, an arm of San Francisco Bay, 61 miles from the sea. Because of their common delta and the difference in volume of their floods, the San Joaquin in the lower 45 miles of its course is subject to flood and injury from the Sacramento.

In the early pioneer days the Sacramento River was a perfectly clear stream with pebbly bottom. From 1850 to perhaps 1865 it was navigable at all seasons of the year for seagoing craft drawing from 9 to 13 feet of water up as far as Sacramento and, for the earlier part of the period named, some little distance beyond Sacramento. Indeed most of the steamers which plied on the river in those days had to be seagoing craft, for they made their way to California from east Atlantic ports around Cape Horn or through the Straits of Magellan.

Sacramento River Flood Control.

What the completion of the Sacramento River flood-control project means to the State and the Nation is indicated by the statement that only through this plan can flood control of the Sacramento River be secured; and that only through flood control thereof can the following results be attained:

(*a*) Restoration and maintenance of navigability of the Sacramento River, on which, in earlier days, ocean freighters drawing 13 feet of water used to deliver their cargoes at Sacramento city, 125 miles from the sea, at all seasons of the year.

(*b*) Protection of the San Joaquin River, which has a common delta with the Sacramento and which is threatened by floods from the Sacramento up to and including the city of Stockton, at the practical head of navigation, 45 miles from the river's mouth, 106 miles from the sea.

(*c*) Maintenance of an inland waterway system, of which the two navigable rivers must be necessarily main arteries. Upon such a waterway system depends in large measure future development of the Sacramento and San Joaquin valleys and the commerce of the San Joaquin today is limited practically to that stretch of the river lying between its mouth and the city of Stockton, a distance of 45 miles, the Government maintaining therein, under existing project, a channel depth of 9 feet. The river is navigable, however, for 15 miles above Stockton. The navigability of the upper river has been practically destroyed by the demands made upon its sources of supply for water for irrigation. In the San Joaquin Valley the volume of available water is less and the quantity of land to be irrigated much greater than in the Sacramento Valley.*

RIVER TRAFFIC.

Navigability of the Sacramento River.

That portion of the Sacramento River below Red Bluff is considered a navigable stream.

Between Chico Landing and Sacramento the annual tonnage handled by river boats has averaged 120,000 tons of an aggregate annual value of $6,000,000, but the tonnage handled between Red Bluff and Chico Landing has been relatively very light and constantly tending to decline.

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*See Supplemental Report on Flood Control of the Sacramento River, submitted by Mr. Curry, House of Representatives, House Report No. 616.

The Sacramento River has a good navigable channel below Colusa. The following shows the low-water depths below Red Bluff, the head of navigation:

Below Sacramento, 64 miles, 7 feet minimum depth.

Sacramento to Colusa, 90 miles, 4 feet minimum depth.

Colusa to Chico, 57 miles, 3 feet minimum depth.

Chico to Red Bluff, 52 miles, 3 feet for about 6 months; 1½ to 2 feet for about 6 months.

Traffic on Sacramento, San Joaquin, and Mokelumne Rivers.

The commerce on the Sacramento River consists mostly of grain, lumber, fruit, vegetables and general merchandise. The following is a comparative statement of the amount and value of this traffic for the last three calendar years.

Year	Short tons	Value
1912	477,292	$27,755,325
1913	733,594	35,856,791
1914	721,090	38,211,760

San Joaquin River.

The commerce for the calendar year 1914 amounted to 772,156 short tons, valued at $35,479,741, and consisted principally of grain, potatoes, onions, beans, and general merchandise.

Year	Short tons	Value
1912	632,591	$38,854,539
1913	820,399	38,341,174
1914	772,156	35,479,741

Tonnage of All Freight and of Grain and Live Stock Carried on San Joaquin and Sacramento Rivers, 1900-1908.

(Tons of 2,000 pounds.)

Year	San Joaquin River, all freight, tons	Sacramento River, all freight, tons
1900	270,887	461,314
1901	357,746	452,965
1902	322,000	404,900
1903	366,038	383,724
1904	360,486	353,164
1905	373,186	365,957
1906	440,300	375,000
1907	736,472	367,224
1908	509,233	394,945

Mokelumne River.

The commerce for the calendar year 1914 amounted to 69,783 short tons valued at $3,045,870, and consisted principally of barley, beans, potatoes, vegetables, sheep, canned goods, and general merchandise.

Year	Short tons	Value
1912	50,443	$2,833,704
1913	90,585	5,079,932
1914	69,783	3,045,870

The high class of freight handled on the San Joaquin and Sacramento rivers is a noticeable feature, the value averaging $50 per ton, almost the highest, if not the highest, reported on any river in the United States. Ninety per cent of all freight between Sacramento and San Francisco and between Stockton and San Francisco is handled by boat, the average rate being 35 per cent less than by rail.

In the lower part of the Sacramento and San Joaquin Valleys there are islands varying in area from 1,500 to 43,000 acres, most of which have been reclaimed for agricultural purposes. This overflow land (swamp land) is probably as good and as productive as any in the State of California. Reclaimed lands that are improved, *i. e.*, hop vineyards, orchards, asparagus and alfalfa lands, etc., are now valued as high as $300 or more per acre, while the average value of the reclaimed land along the 65 miles of the river below Sacramento is about $200 per acre.

Transportation of Wheat.

The wheat grown west of the Rocky Mountains enters into a trade distinct from that of the rest of the United States. The farmer of California, Oregon, or Washington looks to Liverpool and other European ports, not to Chicago and Minneapolis, for his market. His product is carried some 18,000 miles before it reaches the English miller, but this route is cheaper than the 2,000-mile haul across the mountains to milling centers of the Mississippi Valley. Local mills grind considerable quantities, but the surplus for export is regularly carried by sea to Europe.

Sacramento River.

Number of vessels, Registered Tonnage and Number of Passengers.

Class	Number	Net registered tonnage	Passengers
Registered:			
Steamers	41	18,789	139,816
Gas	49	1,421	34,410
Sailing	37	2,193	----------
Unrigged	45	12,004	----------
Unregistered:			
Gas	22	----------	1,259
Sailing	3	----------	----------
Unrigged	13	----------	----------
Totals	210	34,407	175,485

During the spring of 1915 a new line of boats began operating upon the Sacramento River. Two gas schooners make a daily trip from San Francisco to Courtland and return, hauling fruit, vegetables, and other freight.

Through the Northern Electric Railway drawbridge at M street, Sacramento, 3,054 steamboats, 1,005 barges, 969 gas boats, 73 sailing vessels, 30 dredges, and 29 pile drivers passed during the year.

Through the Southern Pacific Railway drawbridge at H street, Sacramento, 895 steamboats, 799 barges, 867 gas boats, 31 sailboats, 27 dredges and 20 pile drivers passed during the year. (Between M and H streets, Sacramento, the project depth changes from 7 feet to 4 feet.)

Through the Southern Pacific Railway drawbridge at Knights Landing, 553 steamboats, 408 barges, 321 gas boats, 6 sailboats, 8 dredges, and 7 pile drivers passed during the year.

Through the Northern Electric Railway drawbridge at Meridian, 424 steamboats, 196 barges, 15 gas boats, 2 sailboats, and 9 dredges passed during the year.

In the above only those passages for which draw operation was required are tabulated.

San Joaquin River.

Class	Number	Net registered tonnage	Passengers
Registered:			
Steamers	22	7,373	72,313
Gas	64	1,030	110,343
Sailing	28	1,509	------------
Unrigged	39	6,033	------------
Unregistered:			
Gas	13	------------	7,011
Sailing	5	------------	------------
Unrigged	21	------------	------------
Totals	192	15,945	189,667

Mokelumne River.

Class	Number	Net registered tonnage	Passengers
Registered:			
Steamers	7	2,185	1,326
Gas	28	345	------------
Sailing	5	217	------------
Unrigged	16	1,720	------------
Unregistered:			
Gas	5	------------	668
Sailing	3	------------	------------
Unrigged	8	------------	------------
Totals	72	4,467	1,994

NOTE.—Through the Southern Pacific Railway bridge over Snodgrass Slough, a tributary of the Mokelumne River, 60 gas boats, 2 sailing vessels, 46 barges, and 6 dredges passed during the year.

Navigable Streams—Length and Depth at Low Water.

Name and points connecting	Distance in miles	Navigable length	Depth at low water, feet	Traffic, tons In 1905	Traffic, tons In 1906
Redwood Creek:					
Mouth to Redwood	----------	1.0	3.0	47,700	----------
San Joaquin River:					
Mouth to Stockton	----------	200	8.0	----------	971,382
Stockton to railroad crossing	----------	----------	3.0	----------	----------
Stockton to Firebaugh	----------	----------	A few inches		
Mokelumne River:					
Mouth to Galt	----------	20.0	2.0	----------	50,000 to 100,000
Mouth to Snodgrass Slough	13.0	----------	6.0	----------	
Sacramento River:					
Mouth to Red Bluff	----------	262.0	2.5	----------	375,000 *
Mouth to Sacramento	64.0	----------	7.0	----------	
Sacramento to Red Bluff	198.0	----------	2.5	----------	
Feather River:					
Mouth to Marysville	----------	30.0	1 to 2	5,306	----------
Petaluma Creek:					
Mouth to Petaluma	----------	16.0	4.0	----------	175,025
Napa River:					
Mouth to Napa	----------	16.0	4.0	----------	182,642

*Steamboat lines only.

Depth of Channel and Distance From Open Sea for California Ports.

Port	Location	Distance from open sea, nautical miles	Depth of channel Mean low water, feet	Depth of channel Mean high water, feet	Remarks
Eureka	Humboldt Bay	5.5	18½	24	
San Francisco	San Francisco Bay	14.8	18½	24	
Oakland	San Francisco Bay	14.8	18½	24	
Monterey	Bay of Monterey	3.0	--------	--------	At wharves, 15 to 36 feet.
Port Harford	On the sea	--------	27	--------	
Santa Barbara	On the sea	--------	25	--------	
Los Angeles ports:					
Port Los Angeles	On the sea	--------	34	--------	
Redondo Beach	On the sea	--------	--------	--------	At wharves, 15 to 48 feet.
San Pedro	San Pedro Harbor	1.9	20	25	
San Diego	San Diego Bay	6.1	25	29¾	

*For further details regarding transportation by water, see Report for 1913, pp. 217-220.

CALIFORNIA FISHERIES IN 1909 AND 1915.*

The principal feature in the California fisheries is a decline in value of products since the year 1904. Although the quantity is greater, fewer men are employed and more motive power in boats.

The quantity of fish, oysters, and whale products caught in 1908 was 645,000 pounds more than in 1899, but the value was $581,000 less. Cod showed a decline, as did flounders, smelt, sole, and crabs. Oysters fell from $867,000 in 1899 to $337,000 in 1908. Salmon showed an increase, the catch amounting to 24 per cent of the total value of the products in 1908, compared with 10 per cent in 1899. Other species that have increased notably are striped bass, barracuda, spiny lobsters, rockfish, catfish, and white sea bass.

The value of the products taken in the shore and boat fisheries in 1908 was $1,627,000, 38 per cent of which was obtained in the Sacramento River, where salmon was the principal species caught, amounting to 7,292,000 pounds. San Francisco Bay was second in rank, according to the value of products taken in the shore and boat fisheries. Herring was the principal species taken in the bay fisheries, while oysters, smelt, sea bass, rockfish, striped bass, and sardines were also taken in considerable quantities.

The vessel fisheries were credited with products valued at $343,000, whalebone and whale oil accounting for $132,000, but the vessel fisheries amounted to only 17 per cent of the total value of the fishery products of the State.

In 1908 salmon stood first, both in quantity and in value, among the species of fish taken in California waters, the State ranking third in the country, both in quantity and in value of the catch of salmon. Of the total quantity, 79 per cent was taken from the Sacramento River. Striped bass ranked second and cod third in value, the latter being taken largely off the coast of Alaska. All were salted, and the catch was 41 per cent less than in 1904.

SUMMARY OF QUANTITIES AND VALUES.

In the value of products from fisheries, California ranked second among the Pacific coast states, both at the canvass of 1904 and 1908. The river or inland fisheries are confined almost exclusively to the rivers flowing into San Francisco Bay, the largest and most productive of which is the Sacramento.

The following tabular statement gives a summary of the industry for 1908:

Number of persons employed	4,129
Vessels and boats, including outfit	$1,066,000
Apparatus of capture	$502,000
Shore and accessory property and cash	$91,000
Value of products	$1,970,000

The estimated value of fishing boats and gear in 1915 was as follows:

For boats	$730,400
Investment in fishing gear	195,800
Total	$926,200

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*For further details regarding California Fisheries, see Report for 1913, pages 220–225.

The quantity and value of fish taken by the shore and boat fisheries from the different waters of the State in 1908 was as follows:

Fishing ground	Quantity, pounds	Value
Sacramento River	11,643,000	$617,000
San Francisco Bay	3,522,000	431,000
Pacific Ocean	8,552,000	249,000
Humboldt Bay, including Eel and Mad rivers	2,888,000	96,000
Monterey Bay	5,248,000	89,000
Monica Bay	2,574,000	67,000
Santa Barbara channel	1,535,000	62,000
Klamath River	433,000	8,900
San Luis Obispo Bay	464,000	6,200
Totals	36,860,000	$1,627,000

Varieties of Fish Caught in 1908.

Variety	Pounds	Value
Salmon	9,211,000	$471,000
Chinook	8,846,000	460,000
Blueback	147,000	4,900
Silver	141,000	4,200
Steelhead	76,000	2,800
Sardines	4,638,000	30,000
Sole	3,487,000	65,000
Cod (salted)	3,298,000	94,000
Barracuda	3,205,000	88,000
Flounders	3,193,000	80,000
Rockfish	2,319,000	60,000
Striped bass	1,776,000	135,000
White sea bass	1,337,000	42,000
Catfish	1,069,000	56,000
Crabs	1,702,000	69,000
Oysters	729,000	337,000
Abalone (meat and shells)	1,235,000	22,000

Crustaceans.

Crabs are taken in Monterey Bay, along the coast from Half Moon Bay to Bodega Bay, and along the coast of Humboldt County. The spiny lobster fisheries are located along the coast of southern California from the northern boundary line of Santa Barbara County south to Mexico, including the adjacent islands. Practically all the shrimps are taken in San Francisco. Ecrevisse are taken in the rivers of Sonoma County.

Mollusks.

San Luis Obispo County furnishes most of the Pismo clams, although considerable quantities are taken on the beaches of Monterey Bay.

The soft shell clams are taken principally in San Francisco Bay and in Tomales Bay, Marin County.

The small quantity of cuttle fish used are taken by Monterey, Santa Cruz, and San Francisco fishermen.

The squid, which are consumed mostly by the Chinese and Japanese, are taken in the vicinity of Monterey Bay. The abalones, while found generally along the rocky sections of the coast, are taken for marketing and canning purposes principally in San Luis Obispo, Monterey, and Santa Cruz counties. Abalones are fairly abundant in several other places along the coast, as for instance Sonoma and Mendocino counties, and there are quite a few shipped from these counties to the San Francisco and Oakland markets.

The large California mussels are taken at various places along the rocky portions of the coast, but are not handled to any great extent by the markets. A smaller variety found in San Francisco Bay is sold in the San Francisco and Oakland markets to some extent.

THE SALMON FISHERIES.

The largest, best-known, and most valuable species is the Chinook, or King salmon, which is found from Ventura River to North Sound, Alaska. There are two runs of spawning fish in the Sacramento, the "spring run," in April, May, and June, spawning mainly in the cold water of the McCloud and Fall rivers. The second, or "fall run," occurs in August, September, and October, and these fish spawn in the riffles in the main river, between Tehama and Redding.

In former years the San Joaquin, and the American and Feather rivers of the Sacramento system, had large runs of salmon, but excessive fishing and the operation of various mining and irrigation projects have practically depleted them.

The Eel and Mad rivers of northern California have only a fall run, while the Klamath River has both a spring and a fall run, and the Smith River, in the northern part of the State, has a spring run alone.

The salmon rivers and fishing grounds in California are: Smith River, Klamath River, Humboldt Bay and tributaries, Mad River, Eel River, Mattole River, a small river in the southern part of Humboldt County, Sacramento and San Joaquin rivers, Pit and McCloud rivers, and Battle Creek.

The principal fishing grounds for salmon are Suisun Bay and the lower part of the San Joaquin and Sacramento rivers. Drift gill nets are used almost exclusively. From Sacramento to Anderson there is considerable commercial fishing with haul seines. The southernmost point on the coast where salmon are taken commercially is Monterey Bay.

Persons Employed. The total number of persons employed in the salmon fisheries in 1909 was 2,675, Contra Costa County leading with 774 persons. These are classified as follows:

	Fishermen	Shoremen	Transporters
White	2,114	276	----------
Japanese	168	5	----------
Chinese	15	----------	----------
Indians	----------	15	----------
Totals	2,297	296	82

The total catch in 1909 amounted to 12,141,937 pounds, valued at $585,995. Contra Costa leads in catch, followed closely by Solano County. Nearly four-fifths of the catch were made with gill nets, while Chinook salmon comprise almost all of the catch.

Production and Value by Species.

Species	Pounds	Value
Blueback	21,000	$689
Chinook (fresh)	11,893,199	575,542
Chinook (salted)	69,049	4,552
Silver (fresh)	99,500	2,675
Silver (salted)	46,000	1,900
Dog	4,200	84
Steelhead trout	8,989	553
Totals	12,141,937	$585,995

Production and Value of Salmon Catch by Counties in 1909.

County	Pounds	Value
Del Norte	655,225	$12,852
Humboldt	864,198	34,124
Marin	5,330	310
San Francisco	91,063	4,055
Solano	3,238,788	168,713
Contra Costa	3,949,080	211,166
San Joaquin	61,187	2,585
Yolo	197,520	10,852
Sacramento	599,723	32,690
Sutter	62,119	1,917
Butte	163,022	8,285
Glenn	72,547	3,627
Tehama	314,102	16,905
Shasta	46,475	2,789
Monterey*	1,779,524	73,134
Santa Cruz*	41,984	1,991
Totals	12,141,937	$585,995

*With lines.

Statistics by Waters in 1909.

Persons Employed. Of the 2,675 persons employed in the industry, 1,880 were on Sacramento River; the next largest was employed on Monterey Bay.

Waters	Fishermen	Shoremen	Transporters	Total
Smith River	47	32		79
Klamath River	37		3	40
Mad River	41			41
Humboldt Bay	7	6		13
Eel River	291	13		304
Sacramento River	1,582	219	79	1,880
Monterey Bay	292	26		318
Totals	2,297	296	82	2,675

Products and Value of the Salmon Catch by Waters.

Waters	Pounds	Value
Smith River	94,000	$3,200
Klamath River	561,225	9,652
Mad River	108,900	4,286
Humboldt Bay	28,000	840
Eel River	727,298	28,998
Sacramento River	8,801,006	463,894
Monterey Bay	1,821,508	75,125
Totals	12,141,937	$585,995

Canned and Cured Salmon.

Mild, Cured, and Smoked Salmon in 1909.

Waters	Mild, cured Chinook		Smoked				Total	
			Chinook		Silver			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eel	64,000	$6,400	50,000	$5,000	3,000	$300	117,000	$11,700
Sacramento	4,095,162	450,019	56,550	8,943	4,660	326	4,156,372	459,288
Monterey Bay	728,800	64,049	4,000	700	-------	-------	732,800	64,749
Totals	4,887,962	$520,468	110,550	$14,643	7,660	$626	5,006,172	$535,737

The output of mild, cured, and smoked salmon in 1915 was 3,187 tierces, compared with 2,650 tierces in 1914.

Sacramento Canned Salmon.

The quantity of canned salmon from the Sacramento River since 1873 increased rapidly the first ten years, until it touched upwards of 200,000 cans in 1882; since that year the quantity packed varied greatly, and rapidly declined until 1905, only 2,780 cases were canned, as the cost of the fish was so high that it did not pay. During the last five years there appears to have been a revival in the industry, although it varies considerably. The number of cases reported being: 1911, 4,142; 1912 (not reported); 1913, 950; 1914, 17,315; 1915, 6,179.

Codfish Catch, 1913-1914.

The codfish catch of the San Francisco fishing fleet in 1913 amounted to 1,639,847 fish; in 1914 to 2,439,202, and in 1915 to 2,482,900 fish.

Sardine Fishery.

A regular sardine fishery exists in Monterey Bay, where large quantities are caught and packed. In 1913 the quantity packed at Monterey amounted to 70,000 cases, and in 1914 to 80,000 cases, and in 1915 the catch was very poor, amounting only to 47,500 cases.

Pack of Tunny Fish.

The pack of tunny fish, which was only commenced a year or two ago, shows a steady increase, the output being:

Year	Cases
1911	42,000
1912	90,000
1913	115,000
1914	325,000
1915	348,000

Long Beach, San Pedro and San Diego, now have large canneries for this fish. The season lasts from about the end of July to the latter part of November.

Abalones.

More than two-thirds of the catch in this State comes from Monterey Bay.

California Oysters Produced.

The production of oysters varies considerably. The figures are not available for every year, but the following summary will give some idea of the size and value of the industry:

Year	Bushels	Value
1890	151,325	$592,137
1895	163,636	539,497
1899	420,000	867,000
1904	188,613	628,023
1908	104,000	337,000
1912	68,037	280,344

In California the oyster industry, including the cultivation of oysters and the oyster trade, centers in San Francisco, and the oyster grounds are located chiefly in San Francisco Bay, although there are oyster grounds also in Tomales and Humboldt bays. The oyster product of the State is all obtained from private grounds, and the season extends practically through the entire year. Of the 68,000 bushels produced in 1913 all, except 600 bushels of native oysters, valued at $1,800, were Eastern oysters, grown from seed oysters brought from the Atlantic coast and planted on the local beds.

Estimated Catch of Fish in 1915.*

Fish, Mollusks and Crustaceans Taken in California, 1915.

	Pounds
Abalone (in shell)	1,250,000
Albacore	30,000,000
Anchovy	1,250,000
Barracuda	3,500,000
Bonita	200,000
Catfish	750,000
Carp	125,000
Croaker	121,400
Cultus cod	800,000
Dogfish	3,000
Flounders, soles and sandabs	9,000,000
Hake	250,000
Hardhead and pike	75,000
Herring	1,450,000
Halibut (California)	7,500,000
Kingfish	600,000
Mackerel	850,000
Mullet	13,000
Perch	208,000
Pompano	35,000
Rock bass	400,000
Rock fish (rockcod, chili peppers, bocaccio, etc.)	5,500,000
Sardines	7,500,000
Salmon	7,000,000
Sea bass (white)	1,250,000
Sculpin	10,000
Sea bass (black)	75,000
Shad	4,500,000
Skates	150,000
Smelts	1,500,000
Striped bass	1,575,000
Sturgeon	5,000
Tom cod	30,000
Trout (lake)	75,000
Trout (steelhead)	35,000
Whitebait	25,000
Yellowtail	1,750,000
Clams (miscellaneous)	850,000
Crabs, dozen	65,000
Oysters (in shell), number	12,000,000
Mussels	150,000
Shrimps	300,000
Spiny lobsters	650,000
Squid and devilfish	1,500,000

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*See Report of the State Fish and Game Commission, 1915.

Number of Cases of Fish Canned in California in 1915.

Kind	1-pound cans*	½-pound cans	¼-pound cans
Tuna	136,046	172,263	51,977
Sardines	45,578	609	
Salmon	17,143	8,230	
Abalone	4,780	4,284	
Bonita	117	5,477	
Yellowtail	465	1,969	36
Shad	5,000		
Shad roe	4,800		
Rockcod	12	817	

*48 cans to the case.

Value of cannery buildings, and equipment, exclusive of boats and nets, $855,000.

Number of people employed in canneries during 1915 season, 1,950.

Fish Licenses. Anglers' licenses for the year ending December 31, 1915 amounted to $89,620; and market fishing licenses for the year ending March 31, 1916, $38,310.

CALIFORNIA GAME.*

The game animals are so valuable in California that the title to them has been retained by the State, and the fees charged for licenses, which expire annually on June 30th, amount to a considerable sum.

The rates are: Residents, $1; nonresidents, $10, and aliens, $25.

The receipts in the last four years have been: 1910-11, $143,265; 1911-12, $146,181; 1912-13, $115,984; 1913-14, 164,111, and in 1914-15, $166,307.

Fish and Game Districts.

In California there are so many different conditions of climate and topography that it is almost impossible to create a blanket fish and game law. When deer, for example, are in proper condition to be killed in one section they are out of condition in another. The legislature in 1915 divided the State into twenty-nine fish and game districts.

Deer. It is reported in many parts of the State that deer are on the increase, but this is doubtful. There are probably killed in the State each year by hunters, 10,000 deer. It has been estimated that every mountain lion will kill at least 52 deer a year; estimating the lions at 250, the number devoured by them would amount to 13,000. Coyotes and other animals would probably bring the total number destroyed to near 30,000. In average years the natural death rate is not great; most of them meet violent deaths, so the above number can be accepted as the number of deer dead from all causes in the State. The total number killed in 1911 was 6,489; in 1912, 7,537; and in 1913, 8,269.

Elk and Antelope. Of the thousands of these animals that formerly ranged the State, there are now but a few scattered bands. In the San Joaquin Valley, near Buttonwillow, and in the Sequoia National Park range are all that are left of the thousands of "tule," a dwarf elk that formerly were found throughout the San Joaquin and Sacramento valleys. This species is peculiar to California, and now only number between 400 and 500 head.

Another variety is found in small numbers in Humboldt and Del Norte counties, in bands numbering from six to twelve, but the total number probably does not exceed 200.

The Antelope. The antelope is still found in the extreme eastern part of the State; some are found in Antelope Valley, in the northeastern part of Los Angeles County, while in the western San Joaquin Valley the largest band of the State is found. In Modoc, Lassen, and Siskiyou counties there are several small bands. All told, there are probably about 600 antelope left in the State.

Mountain Sheep. These still flourish in considerable numbers in the southeastern part of the State. Formerly this magnificent game animal ranged over the entire Sierra Nevada region and across to the lower Coast Range, as far north as San Luis Obispo County, but they are now restricted to the most inaccessible portions.

Bear. The grizzly bear is practically extinct. The common brown or black bear is fairly abundant in some parts. It is for the most part a harmless species, feeding on roots, berries, grubs and insects, and rarely kills sheep or hogs. The pelt of a well-colored bear in prime condition is worth from $20 to $40.

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*See Report of the California Fish and Game Commission, 1910–12 and 1912–14.

Fur-bearing Animals. Few people realize the importance of fur-bearing animals in this State, yet each year furs worth nearly $200,000 are shipped to the various fur centers.

Wild Ducks and Geese. These are the most abundant game birds in the State, although neither of them are nearly as numerous as they were in former years. Ducks breed throughout the entire State, and the number killed in California in 1911 is estimated at approximately one million.

Quail. Quail are slowly decreasing throughout most of the State, on account of the great number of hunters. In parts of the State there is urgent need of a close season for a number of years if quail are to be kept from extermination. Mountain quail have become very scarce throughout the southern end of the State, and in the coast region below San Francisco. In other parts of the State they are about holding their own.

Grouse. Ruffed grouse are fairly abundant in the extreme northwestern corner of the State. The blue grouse is becoming scarcer, and where the settlers have engaged in sheep raising, they are almost extinct.

The Sage Hen. This bird is found only in the eastern part of the State, in the true sagebrush country. The sage hen is practically never found below an elevation of 3,000 to 4,000 feet, nor out of the true sagebrush country. It is the largest California game bird.

Doves and Pigeons. The most difficult bird to arrange a proper season for is the common mourning dove, January being the only month in which they do not nest. On this account many sportsmen advocate the removal of the dove from the list of game birds. There is urgent need for the protection of the wild (band-tail) pigeon. This is the slowest breeding game bird in the United States. One egg is the complete set, and probably only one egg is laid the entire year.

Pheasants and Wild Turkeys and Hungarian Partridges. Of the introduced game birds, ring-neck pheasants have done well, especially in Humboldt County; they have also increased in parts of Santa Clara and San Joaquin valleys. Wild turkeys have been liberated in the lower Sierra Nevada region; other plants have been made in San Diego, San Bernardino, Monterey, San Benito, Alameda, Sonoma, and Humboldt counties. Hungarian partridges have been given a good trial, but, as yet, without success.

PUBLIC ROADS.

The total mileage of public roads in the United States in 1914 was estimated as 2,273,131 miles, and the total surfaced roads, 247,490 miles. In California the total mileage of all roads in 1914 was estimated as 48,069 miles, of which 9,388 were surfaced.

The practice of improving the earth roads by the use of oil in California has been, to a large extent, discontinued, and this has had the effect of cutting down the mileage of that class of roads considerably, and so reducing the total mileage of improved roads. The information from some of the counties is not altogether satisfactory, but the figures are as accurate and complete as it was possible to obtain at the time. California had, at the close of 1909, 48,069 miles of public roads, which exceeds the total mileage reported for 1904 by·1,416 miles.

Of the total mileage of public roads in the State in 1909, 579 miles were reported as having been surfaced with stone, 6,054 miles with gravel, 1,289 miles with sand clay, and 653 miles with oiled earth, making a total mileage of improved roads of 8,587, or 17.87 per cent. This is about 1 per cent less than was reported in 1904, and this decrease is due principally to the fact that the oiling of earth roads has been abandoned to a large extent, for while there were 2,541 miles of earth roads reported to have been oiled in 1904, there were only 653 miles of oiled roads reported in 1909.

State Highway Mileage, January 1, 1915.

Total all surfaced roads in state (approximate)	9,388
Total all public roads in state	48,069
Percentage of surfaced roads in state	19.5
State and state-aid roads built in 1914	406
Total all state and state-aid roads built to January 1, 1915	1,124
Roads maintained with state aid, 1914	919

Motor Vehicle Registration and Revenues, 1914-1915.

(Compiled by U. S. Department of Agriculture.)

	California, 1914	Total United States, 1914	California, 1915
Automobiles	123,504	1,666,984	163,795
Motorcycles	24,709	152,945	26,401
Owners and chauffeurs' licenses	18,601	427,179	20,848
Manufacturers' and dealers' licenses	927	21,255	
Automobile fines to state road fund		$101,364	
Gross registration revenues	$1,338,785 25	$12,270,035	
Net registration revenues	$1,182,457 14		

Summary of California State Automobile Registration, 1915.*

Sources of revenue	Registrations	Fees
Automobiles	163,795	$1,886,617 00
Motorcycles	26,401	51,902 00
Automobile dealers	880	46,427 50
Motorcycle dealers	207	1,023 25
Chauffeurs	20,848	41,462 00
Substitutions		31,786 25
Duplicate plates, etc.		465 00
Gross receipts		$2,059,683 00

Total fees received	$2,059,683 00
Refunds allowed by law	28,479 00
Net receipts	$2,031,204 00
Operating expense (includes plates)	166,218 43
Balance apportioned equally between state and counties for maintenance of roads	$1,864,985 57
Average automobile fee	$11.518
Percentage of receipts used for operating expense	.081834

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*These figures and the two following tables, from the reports of the State Motor Vehicle Department.

TABLE XXXVII.

Statement of Total Number of Registrations of Automobiles, Motorcycles and Chauffeur Licenses Issued January 1 to December 31, 1915.

Counties	Automobiles	Motorcycles	Chauffeurs
Alameda	11,440	1,962	1,297
Alpine	11	1	0
Amador	241	24	17
Butte	1,363	241	57
Calaveras	225	25	9
Colusa	502	60	34
Contra Costa	1,232	300	79
Del Norte	96	12	3
El Dorado	203	25	15
Fresno	6,177	1,405	265
Glenn	558	76	23
Humboldt	1,259	296	215
Imperial	1,785	116	79
Inyo	247	15	11
Kern	3,320	599	267
Kings	1,144	147	16
Lake	234	28	38
Lassen	241	24	7
Los Angeles	55,217	8,188	7,754
Madera	435	105	17
Marin	833	115	112
Mariposa	86	5	19
Mendocino	627	42	45
Merced	883	151	40
Modoc	230	13	16
Mono	18	0	1
Monterey	1,048	158	119
Napa	883	155	84
Nevada	293	37	23
Orange	4,913	932	239
Placer	630	98	45
Plumas	148	9	22
Riverside	2,844	823	111
Sacramento	4,655	938	688
San Benito	471	73	37
San Bernardino	4,404	1,057	192
San Diego	7,232	1,069	1,083
San Francisco	17,763	1,754	5,931
San Joaquin	3,644	847	223
San Luis Obispo	978	127	101
San Mateo	1,500	221	281
Santa Barbara	2,469	320	218
Santa Clara	5,275	1,248	292
Santa Cruz	1,173	218	54
Shasta	401	51	15
Sierra	72	2	8
Siskiyou	563	42	39
Solano	1,011	219	74
Sonoma	2,535	363	134
Stanislaus	2,486	468	86
Sutter	445	62	17
Tehama	556	138	29
Trinity	48	1	8
Tulare	3,125	563	65
Tuolumne	360	26	29
Ventura	1,797	190	73
Yolo	1,045	154	44
Yuba	421	63	48
Totals	163,795	26,401	20,848

TABLE XXXVIII. -

Motor Vehicle Receipts by Counties from January 1 to December 31, 1915.

Counties	Gross receipts	Net receipts	Pro rata disbursements	Total apportionment	County apportionment
Alameda	$145,933 00	$144,125 50	$11,866 47	$132,259 03	$66,129 51
Alpine	134 50	134 50	16 34	118 16	59 08
Amador	2,745 75	2,740 75	246 00	2,494 75	1,247 38
Butte	16,227 50	16,125 50	1,341 15	14,784 35	7,392 18
Calaveras	2,562 50	2,547 50	231 58	2,315 92	1,157 96
Colusa	6,782 75	6,775 25	557 66	6,217 59	3,108 79
Contra Costa	15,237 00	15,081 50	1,278 57	13,802 93	6,901 47
Del Norte	1,062 00	1,054 50	87 57	966 93	483 46
El Dorado	2,429 00	2,414 00	208 17	2,205 83	1,102 91
Fresno	73,163 25	72,613 75	5,967 14	66,646 61	33,323 31
Glenn	6,879 00	6,821 50	545 14	6,276 36	3,138 18
Humboldt	16,767 00	16,722 50	1,384 94	15,337 56	7,668 79
Imperial	21,320 00	21,165 00	1,653 91	19,511 09	9,750 55
Inyo	2,919 50	2,917 00	247 70	2,669 30	1,334 65
Kern	39,510 75	39,242 25	3,246 82	35,996 43	17,998 21
Kings	13,206 75	13,107 25	1,063 63	12,043 62	6,021 81
Lake	2,781 00	2,773 50	234 02	2,539 48	1,269 74
Lassen	2,959 25	2,901 75	321 45	2,580 30	1,290 15
Los Angeles	694,756 50	680,314 25	55,499 87	624,814 38	312,407 19
Madera	5,227 50	5,196 00	423 28	4,772 72	2,386 36
Marin	10,524 25	10,470 25	905 30	9,564 95	4,782 48
Mariposa	1,303 25	1,303 25	140 72	1,162 53	581 26
Mendocino	7,785 25	7,767 75	646 57	7,121 18	3,560 60
Merced	10,447 50	10,415 50	895 46	9,520 04	4,760 02
Modoc	2,704 25	2,691 75	248 64	2,443 11	1,221 55
Mono	189 50	189 50	20 85	168 65	84 33
Monterey	13,913 50	13,796 50	1,126 24	12,670 26	6,335 13
Napa	10,871 75	10,804 25	863 45	9,940 80	4,970 39
Nevada	3,416 00	3,361 00	301 90	3,059 10	1,529 56
Orange	59,083 75	58,559 25	4,622 85	53,936 40	26,968 20
Placer	7,605 00	7,567 50	657 40	6,910 10	3,455 06
Plumas	1,699 00	1,694 00	145 57	1,548 43	774 22
Riverside	34,349 25	34,061 75	2,719 87	31,341 88	15,670 94
Sacramento	58,007 25	57,255 75	4,814 82	52,440 93	26,220 47
San Benito	5,543 50	5,531 00	462 88	5,068 12	2,534 05
San Bernardino	51,861 75	51,660 25	4,167 81	47,492 44	23,746 22
San Diego	89,790 75	88,715 25	7,263 00	81,452 25	40,726 12
San Francisco	249,192 50	244,128 00	19,883 48	224,244 52	112,122 26
San Joaquin	46,786 25	46,533 75	3,852 87	42,680 88	21,340 45
San Luis Obispo	11,484 75	11,429 75	1,009 55	10,420 20	5,210 10
San Mateo	19,734 00	19,579 00	1,619 17	17,959 83	8,979 91
Santa Barbara	30,355 25	30,158 75	2,472 82	27,685 93	13,842 96
Santa Clara	67,240 75	66,824 25	5,374 87	61,449 38	30,724 68
Santa Cruz	14,524 00	14,462 00	1,174 17	13,287 83	6,643 91
Shasta	4,925 25	4,910 25	393 87	4,516 38	2,258 20
Sierra	904 25	904 25	87 61	816 64	408 31
Siskiyou	6,914 75	6,907 75	564 39	6,343 36	3,171 68
Solano	12,800 50	12,721 50	1,033 50	11,688 00	5,844 01
Sonoma	30,728 25	30,453 75	2,450 56	28,003 19	14,001 59
Stanislaus	29,958 25	29,676 75	2,374 16	27,302 59	13,651 30
Sutter	5,187 75	5,155 25	435 81	4,719 44	2,359 72
Tehama	6,969 25	6,919 25	551 49	6,367 76	3,183 87
Trinity	517 00	517 00	55 80	461 20	230 60
Tulare	35,785 00	35,543 00	2,873 28	32,669 72	16,334 86
Tuolumne	4,279 50	4,267 00	363 90	3,903 10	1,951 55
Ventura	21,864 75	21,764 50	1,740 71	20,023 79	10,011 89
Yolo	12,470 75	12,393 25	1,027 74	11,365 51	5,682 76
Yuba	5,360 25	5,335 75	453 94	4,881 81	2,440 90
Totals	$2,059,683 00	$2,031,204 00	$166,218 43	$1,864,985 57	$932,492 78

TABLE XXXIX.

Miles of Public Roads in 1909.

Counties	Total mileage of all public roads	Mileage of improved roads					Approximate percentage of roads improved
		Stone	Gravel	Sand clay	Oiled	Total	
Alameda	765	25	400			425	55.55
Alpine	100						
Amador	500	15	20			35	7.00
Butte	1,200	5	400			405	33.75
Calaveras	606	5	40			45	7.42
Colusa	578		302			302	52.24
Contra Costa	500		100	10	40	150	30.00
Del Norte	125		30			[1]42.5	34.00
El Dorado	900			5		5	.55
Fresno	1,500			20	150	170	11.33
Glenn	500		138			138	27.60
Humboldt	1,130	10	300	105		415	36.72
Imperial	726						
Inyo	500						
Kern	1,100	2			100	102	9.27
Kings	500				92	92	18.40
Lake	488		160			160	32.78
Lassen	720		25	25		50	6.94
Los Angeles	1,500	[2]85	1,000			1,085	72.33
Madera	410				30	30	7.31
Marin	309						
Mariposa	355						
Mendocino	1,200						
Merced	450	1	136			137	30.44
Modoc	766		10			10	1.30
Mono	380						
Monterey	600	50	50			100	16.66
Napa	560	3	450			453	80.89
Nevada	600	30				30	5.00
Orange	500		25	5		30	6.00
Placer	775	7				7	.90
Plumas	385		10			10	2.59
Riverside	800	4	48	2		54	6.75
Sacramento	1,500	86	20			106	7.06
San Benito	451		160	150		310	68.73
San Bernardino	[3]840						
San Diego	5,200			450		450	8.65
San Francisco	[4]						
San Joaquin	990	12	25			37	3.73
San Luis Obispo	1,100		162		1	163	14.82
San Mateo	350	131	65	15	17	228	65.14
Santa Barbara	750	16	45		5	66	8.80
Santa Clara	1,200	20	600	200	6	826	68.83
Santa Cruz	420	12.25	25	6	7	50.25	11.96
Shasta	1,575		66	170		236	14.98
Sierra	525						
Siskiyou	2,625	.5	20	4		24.5	.93
Solano	630	9	25	1		35	5.55
Sonoma	1,260	35	600	120		755	59.92
Stanislaus	470		55			55	11.70
Sutter	350	8	50			58	16.57
Tehama	650	5	60	1		66	10.15
Trinity	200		5			5	2.50
Tulare	2,285				60	60	2.62
Tuolumne	290		52		15	67	23.10
Ventura	700				100	100	14.28
Yolo	680	2.5	360		30	392.5	57.72
Yuba	1,000		15			15	1.50
Totals	48,069	579.25	6,054	1,289	653	[1]8,587.75	17.87

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[1] Includes 12.5 miles of wood puncheon road. [2] Bituminous—macadam. [3] This is exclusive of roads in the Mojave Desert, which comprises about 85 per cent of the county. [4] Included in the city of San Francisco. No county roads in this county.

TABLE XXXIX—Continued.

Increase in Five Years.

Counties	Total mileage of all public roads	Mileage of improved roads					Approximate percentage of roads improved
		Stone	Gravel	Sand clay	Oiled	Total	
Year 1904	46,653	418.5	5,843.5	---------	2,541	8,803	18.87
Year 1909	48,069	579.25	6,054	1,289	653	[1]8,587.75	17.87
Increase	1,416	160.75	210.5	289	---------	---------	---------

TABLE XL.

Cost Data of Roads in 1909.

County	Average cost per mile			
	Sand clay	Gravel	Macadam	Bituminous
Alameda	------------	*$1 35	*$1 35	------------
Del Norte	------------	2,500 00	------------	------------
Glenn	------------	†89	------------	------------
Humboldt	------------	*60	*95	*
Los Angeles	------------	------------	------------	$11,000 00
Merced	------------	------------	9,000 00	------------
Nevada	------------	1,400 00	------------	------------
Riverside	------------	*14	------------	*76
Sacramento	------------	------------	------------	7,500 00
San Diego	$625 00	------------	------------	*1 62
San Mateo	------------	------------	*59	*1 73
Santa Barbara	------------	------------	------------	7,800 00
Santa Clara	200 00	1,000 00	6,000 00	8,000 00
Santa Cruz	------------	------------	5,200 00	------------
Shasta	------------	1,500 00	------------	------------
Siskiyou	------------	1,000 00	------------	------------
Sonoma	------------	*1 25	*1 87	------------
Tehama	------------	850 00	1,300 00	------------
Yolo	------------	*10	*63	------------
Average	$412 00	$1,375 00	$5,375 00	$8,575 00

*Average cost per square yard: Gravel, 69 cents; macadam, $1.08; bituminous, $1.37.
†Cost per cubic yard.

PART X.

FINANCE AND TAXATION.

Tariff Acts 1789–1913; Imports and Exports of Gold and Silver 1890–1915; Foreign Trade and California Ports 1890–1915; Total Assessed Value by Counties 1910–1915. Assessed Value of All Property, 1850–1915.*

TARIFF ACTS.

Tariff Acts Passed by Congress.

(From 1789 to 1913.)

1789. July 4th.
1790. August 10th.
1791. March 3d.
1792. May 2d.
1794. June 7th.
1795. January 29th.
1797. March 3d.
1800. May 13th.
1804. March 27th.
1816. April 27th.
1818. April 20th.
1824. May 22d.
1828. May 19th.
1832. July 14th.
1833. March 2d.
1842. August 30th.
1846. July 30th.
1857. March 3d.
1861. March 2d.
1861. August 5th.
1862. July 14th.
1863. March 3d.
1864. June 30th.
1865. March 3d.
1866. July 28th.
1867. March 2d.
1870. July 14th.
1872. June 6th.
1875. February 8th.
1883. March 3d.
1890. June 10th.
1890. October 1st (McKinley bill).
1894. August 27th (Wilson bill).
1897. July 24th (Dingley bill).
1905. March 3d (Philippine tariff).
1909. August 5th (Paine-Aldrich bill).
1909. August 5th (Philippine tariff).
1913. October 3d (Wilson bill).

In addition to the above 38 acts, there are 224 other miscellaneous acts, proclamations, and joint resolutions, making a total of 262 on the subject of the tariff. The act which came into effect on October 4, 1913, makes a considerable reduction on agricultural products and places many articles on the free list.

FOREIGN TRADE AND CALIFORNIA IMPORTS AND EXPORTS.

Custom districts and ports.	*Sub-ports of entry.*
San Francisco	Oakland, Port Hartford, Monterey.
Los Angeles	Santa Barbara, Redondo Beach and San Pedro.
San Diego	
Humboldt	Eureka.

In 1914 these subports of entry were consolidated into two districts, San Francisco for northern California, and southern California including Los Angeles and San Diego.

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*For detailed statistics regarding State and National Banks, Steam and Electric Railroads, and Insurance, see Report for 1913, pages 240-250.

TABLE XLI.

TARIFF CHANGES, 1909 AND 1913.

Summary of Principal Agricultural Products.

Article	Act of August 5, 1909	Act of October 3, 1913
Agricultural implements and machines	15 per cent	Free
Apples, peaches, pears, quinces, cherries, plums	25¢ bushel	10¢ bushel
Apricots and peach kernels	4¢ pound	3¢ pound
Bananas	Free	No change
Beans and peas, prepared	2½¢ pound	1¢ pound
Beans	45¢ bushel	25¢ bushel
Beeswax	Free	No change
Beets	25 per cent	5 per cent
Beets (sugar)	10 per cent	5 per cent
Berries, in natural state	1¢ quart	½¢ quart
Brandy and other spirits	$2.60 proof gal.	No change
Casks, barrels, packing boxes	30 per cent	15 per cent
Champagne	$9.60 per dozen	No change
Cider	5¢ per gallon	2¢ per gallon
Cotton, raw	Free	No change
Cranberries	25 per cent	10 per cent
Currants, Greek	2¢ pound	1½¢ pound
Dates	1¢ pound	No change
Eggs (fresh)	Free	No change
Evaporated fruits	2¢ pound	1¢ pound
Figs	2½¢ pound	2¢ pound
Fruit plants, tropical	Free	No change
Grapes (in packages)	25¢ cubic foot	No change
Honey	20¢ gallon	10¢ gallon
Lemons	1½¢ pound	*
Oranges, limes, pomeloes	1¢ pound	*
Nursery stock	25 per cent	15 per cent
Nuts—		
Almonds, unshelled	6¢ pound	4¢ pound
Walnuts, shelled	4¢ pound	3¢ pound
Walnuts, unshelled	5¢ pound	4¢ pound
Filberts, shelled	3¢ pound	2¢ pound
Filberts, unshelled	5¢ pound	4¢ pound
Peanuts, shelled	3¢ pound	2¢ pound
Peanuts, unshelled	1¢ pound	¾¢ pound
All other nuts	1¢ pound	1¢ pound
All other nuts (from Philippine Islands)	1¢ pound	Free
Olives, in bottles, less than 5 gallons	25¢ gallon	15c gallon
Olives, in packages, over 5 gallons	15¢ gallon	
Olive oil in bottles, less than 5 gallons (edible)	50¢ gallon	30¢ gallon
Other olive oil	40¢ gallon	20¢ gallon
Olive oil fit only for mechanical or manufacturing purposes	Free	No change
Petroleum and mineral oils	Free	No change
Onions	40¢ bushel	20¢ bushel
Peas, green or dried	25¢ bushel	10¢ bushel
Pickles and sauces	40 per cent	25 per cent
Pineapples in barrels or packages	8¢ cubic foot	6c cubic foot
Pineapples preserved in own juice	25 per cent	20 per cent
Potatoes (from countries imposing duty on American potatoes)	25¢ bushel	10 per cent
Potatoes	25¢ bushel 60 lbs.	Free
Poultry, live	3¢	1¢
Poultry, dead	5¢	2¢
Prunes	2¢ pound	1¢ pound
Raisins and dried grapes	2½¢ pound	2¢ pound
Rice, cleaned	2¢ pound	1¢ pound
Rice, uncleaned	1¼¢ pound	⅝¢ pound
Sugar	Various rates	†
Sugar beets (see Beets).		
Vegetables, prepared or pickled	40 per cent	25 per cent
Vegetables, natural, not otherwise specified	25 per cent	15 per cent
Vinegar	7½¢ per proof gal.	4¢ per proof gal.
Wine and brandy	Various rates	No change

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*In packages, capacity 1¼ cubic feet, or less, 18¢ per package; exceeding 1¼ cubic feet and not exceeding 2½ cubic feet, 35¢ per package; exceeding 2½ cubic feet and not exceeding 5 cubic feet, 70¢ per package; exceeding that size or in bulk, ½ of 1¢ per pound.

†No change till March 1, 1914, when a reduction of about 12½ per cent took place. After May 1, 1916, sugar will be admitted free.

TABLE XLI—Continued.

Farm Animals and Dairy Products.

Commodity	Before October 4, 1913	October 4, 1913, and after
Animals:		
Asses	Breeding purposes and teams of immigrants, free; all other, 20 per cent ad valorem.	Breeding purposes and teams of immigrants, free; all other, 10 per cent ad valorem.
Cattle	Breeding purposes and teams of immigrants, free; all other: less than 1 year, $2 per head; all other, worth not over $14, $3.75 per head; worth over $14, 27½ per cent ad valorem.	Free.
Goats	20 per cent ad valorem	Free.
Horses	Breeding purposes and teams of immigrants, free; all others: worth $150 or less per head, $30; worth over $150, 25 per cent ad valorem.	Breeding purposes and teams of immigrants, free; all other, 10 per cent ad valorem.
Mules	Same as horses	Same as horses.
Sheep	Breeding purposes, free; all other: less than 1 year old, 75 cents per head; 1 year old and over, $1.50.	Free.
Swine	Breeding purposes, free; all other, $1.50 per head.	Free.
Dairy products:		
Butter	6 cents per pound	2½ cents per pound.
Cheese	6 cents per pound	20 per cent ad valorem.
Cream	5 cents per gallon	Free.
Milk	Fresh, 2 cents per gallon; condensed and evaporated, 2 cents per pound.	Free.
Hides and skins, raw	Free	Free.
Meat:		
Beef and veal	Fresh beef, 1½ cents per pound; other beef, 25 per cent ad valorem; veal, 1½ cents per pound.	Free.
Mutton and lamb	1½ cents per pound	Free.
Pork	Fresh, 1½ cents per pound; bacon and hams, 4 cents per pound; other pork, 25 per cent ad valorem.	Free.
Sausage	Bologna, or frankfurter, free; other sausage, 25 per cent ad valorem.	Free.
Wool	Class 1, clothing, etc., wools; unwashed, 11 cents per pound; washed, 22 cents; scoured, 33 cents. Class 2, combing, etc., wools, unwashed, 12 cents per pound; washed, 12 cents; scoured, 36 cents. Class 3: value not over 12 cents per pound, 12 cents; over 12 cents, 21 cents.	Free on and after Dec. 1, 1913.

Cereals, Hay, Hops, and Straw.

Barley, 30¢ per bushel of 48 pounds	15¢ per bushel.
Broom corn, $3 per ton	Free.
Buckwheat, 15¢ per bushel of 48 pounds	Free.
Corn, 15¢ per bushel of 56 pounds	Free.
Oats, 15¢ per bushel of 32 pounds	6¢ per bushel.
Rye, 10¢ per bushel	Free.
Wheat, 25¢ per bushel	Free.
Wheat flour, 25 per cent ad valorem	Free.
Hay, $4 per ton	$2 per ton.
Hops, 16¢ per pound	No change.
Straw, $1.50 per ton	50¢ per ton.

TABLE XLII.

Imports and Exports of Gold and Silver (Coin and Bullion) of California Ports, 1890-1915 for fiscal year ending June 30.

San Francisco.

Year	Gold		Silver		Gold and Silver	
	Imports	Exports	Imports	Exports	Total imports	Total exports
1890	$4,751,582	$1,520,262	$3,269,267	$13,258,391	$8,020,849	$14,778,653
1891	6,358,074	1,646,118	3,634,455	5,609,371	9,992,529	7,255,489
1892	9,736,872	803,791	3,086,706	9,458,354	12,823,578	10,262,145
1893	5,508,193	1,110,013	2,661,819	13,870,229	8,170,012	14,980,242
1894	2,693,636	1,202,443	2,126,973	13,142,267	4,820,609	14,344,710
1895	1,858,878	708,293	1,971,768	13,344,012	3,830,646	14,052,305
1896	1,206,234	854,554	2,642,372	11,763,449	3,848,606	12,618,003
1897	9,647,628	1,083,945	2,611,694	9,459,133	12,259,322	10,543,078
1898	25,799,405	1,217,490	2,472,347	9,514,531	28,271,752	10,732,021
1899	32,124,013	1,774,717	2,551,666	4,889,974	34,675,679	6,664,691
1900	10,574,256	2,025,189	3,096,775	7,502,120	13,671,031	9,527,309
1901	24,911,109	364,758	3,738,814	7,927,900	28,649,923	8,292,658
1902	14,338,906	781,826	4,169,221	8,368,761	18,508,127	9,150,587
1903	9,263,674	3,114,023	2,679,547	6,392,414	11,943,221	9,506,437
1904	40,366,770	652,277	3,492,909	4,600,950	43,859,679	5,253,227
1905	15,590,871	5,905,700	3,003,796	6,622,002	18,594,667	12,527,702
1906	4,233,579	5,366,189	2,513,861	9,417,951	6,747,440	14,784,140
1907	14,504,917	22,391	3,414,584	2,410,717	17,919,501	2,433,108
1908	3,759,329	34,539	3,164,428	5,182,657	6,923,757	5,217,196
1909	3,588,424	3,033,975	2,652,954	6,886,849	6,241,378	9,920,824
1910	3,362,104	27,008,324	2,582,352	7,314,954	5,944,456	34,323,278
1911	8,111,108	20,690	1,579,109	9,262,759	9,690,217	9,283.449
1912	4,532,321	7,034,962	1,458,089	9,905,094	5,985,410	16,940,056
1913	3,941,975	113,108	1,808,461	11,753,927	5,750,436	11,867,035
1914	1,831,388	5,090	1,646,866	9,494,498	3,478,254	9,499,588
1915	25,881,230	68,855	2,150,838	6,021,927	28,032,068	6,090,782

Imports of Gold and Silver Into Southern California, 1914-1915.†

	Gold	Silver	Total gold and silver
1914	$22,009	$27,146	$49,155
1915	7,331	1,714	9,045

†Since 1914 the returns for Los Angeles and San Diego are combined under this heading. There are no exports of gold and silver from Southern California.

TABLE XLII—Continued.

Imports of Gold and Silver Into San Diego and Los Angeles, 1900-1913.

Year	Los Angeles			San Diego		
	Gold	Silver	Total gold and silver imports	Gold	Silver	Total gold and silver imports
1900	$50		$50	$62,319	$948	$63,267
1901				67,392		67,392
1902				46,690	948	47,638
1903		$172	172	14,233		14,233
1904		25	25	16,774	418	17,192
1905				32,565		32,565
1906		*172	*172	9,695		9,695
1907				4,915	996	5,911
1908	25		25	10,553	997	11,550
1909	50		50	29,066		29,066
1910				26,638		26,638
1911				11,481		11,481
1912	6,000		6,000	16,053	4,686	20,739
1913				6,640		6,640

NOTE.—The custom district of Los Angeles was established in 1883, and that of San Diego in 1879. No gold or silver is exported except through San Francisco.

*Also $1,000 in silver exported.

TABLE XLIII.

Imports and Exports of Foreign and Domestic Merchandise From California Ports, 1890-1915.*

(For fiscal year ending June 30.)

Year	San Francisco		Los Angeles	
	Imports	Exports	Imports	Exports
1890	$48,751,223	$36,876,091	$169,955	$220
1891	50,943,299	40,168,771	315,226	
1892	47,135,684	40,737,044	398,517	42,535
1893	45,291,099	31,144,180	502,044	
1894	38,146,626	24,903,009	445,966	102,943
1895	36,269,637	24,873,148	657,671	6,696
1896	41,400,317	31,582,910	679,944	30,487
1897	34,375,945	39,647,606	504,028	7,499
1898	42,822,945	41,223,759	476,042	110,440
1899	35,746,577	30,214,904	769,472	4,090
1900	47,869,628	40,368,288	1,011,090	
1901	35,161,753	34,596,792	885,473	30
1902	35,102,981	38,183,755	676,615	80
1903	36,454,283	33,502,616	1,019,481	682
1904	37,542,978	32,547,181	1,292,560	503
1905	46,675,545	49,924,026	810,000	291
1906	44,433,271	39,915,269	827,059	12,105
1907	54,094,570	33,026,664	1,559,322	45,000
1908	48,251,476	28,000,069	1,538,199	187,247
1909	49,998,111	31,669,370	1,305,341	193.221
1910	49,350,643	31,180,760	1,942,647	135,911
1911	53,885,021	40,624,903	2,655,558	86,415
1912	59,235,471	49,249,734	3,225,618	161,735
1913‡	62,501,681	66,021,385	2,747,601	253,562

NOTE.—The customs district of San Francisco was established September 28, 1850; that of San Diego in 1879; Los Angeles (Wilmington) and Humboldt in 1883.

*For the imports and exports, 1851–1879, see Report for 1912, pages 266–267.

Year	San Diego		Humboldt		Total*	
	Imports	Exports	Imports	Exports	Imports	Exports
1890	$437,665	$264,644	$1,549	$108,051	$49,360,392	$37,249,006
1891	538,066	394,824	4,005	154,503	51,800,596	40,718,098
1892	380,770	441,200	3,925	151,553	47,918,906	41,372,332
1893	407,236	79,443	1,571	138,008	46,201,950	31,361,631
1894	383,399	379,586	------------	106,750	38,975,991	25,492,288
1895	346,155	45,225	2,110	106,594	37,275,573	25,031,663
1896	324,465	196,419	1,460	102,440	42,406,186	31,912,256
1897	222,063	199,540	1,183	162,027	35,103,219	40,016,672
1898	198,417	491,139	1,181	146,725	43.498,645	41,972,063
1899	397,115	1,425,861	2,006	195,678	36,915,170	31,840.533
1900	559,585	2,739,174	1,528	253,616	49,441,831	43,361,078
1901	511.661	963,014	------------	163,682	36,558,887	35,723,518
1902	440,239	255,833	1,908	319,550	36,221,743	30,759,218
1903	417,557	168,993	3,423	497,810	37,894,744	34,170,101
1904	459,786	317,830	7,107	550,436	39,302,431	33,415,950
1905	275,631	320,533	1,821	140,441	47,762,997	50,385,291
1906	464,634	299,579	4,283	737,940	45,729,247	40,964,893
1907	653,789	809,809	1,173	677,092	56,308,854	34,558,565
1908	722,359	641,223	10,736	759,726	50,522,770	29,788,265
1909	535,257	397,626	4,862	894,228	51,843,571	33,154,445
1910	741,916	928,994	6,317	1,031,182	52,041,523	33,276,847
1911	875,184	1,022,481	6.779	1,058,615	57,422,542	42,792,414
1912	1,076,990	1,092,159	7,622	1,231,441	63,545,701	51,735,069
1913	1,022,904	1,137,116	8,330	1,028,046	66,280,516	68,440,109

On account of the reorganization of the customs districts since 1913, they having been consolidated into San Francisco for the northern ports, and southern California for the southern ports, the above detailed classification can not be continued.

*To these totals must be added the total imports and exports of gold and silver in Table XL.

Year	San Francisco		Southern California		Total	
	Imports	Exports	Imports	Exports	Imports	Exports
1914	$67.111,081	$63,374,909	$4,908,543	$2,010,280	$72,019,624	$65,385,189
1915	76,068,028	81,500,979	4,716,390	2,512,355	80,784,418	84,013,334

TABLE XLIV.

Grand Total Value of All Assessed Property in California,* 1912-1915.

(From the Reports of the State Controller's Department.)

Counties	1912	1913	1914	1915
Alameda	$243,043,586	$256,363,895	$252,751,974	$262,482,711
Alpine	539,905	546,189	550,359	781,313
Amador	6,081,630	6,154,014	6,299,280	6,739,328
Butte	25,469,997	25,135,048	25,247,155	24,941,991
Calaveras	6,607,594	7,920,748	8,010,010	7,983,665
Colusa	14,685,281	15,485,375	15,662,550	16,036,728
Contra Costa	42,631,665	47,731,341	52,204,930	54,332,638
Del Norte	4,880,765	5,079,461	5,078,804	5,077,652
El Dorado	6,785,170	6,954,117	7,104,168	7,083,583
Fresno	78,998,660	92,261,816	96,567,818	96,803,387
Glenn	16,980,132	17,261,076	17,576,399	17,472,821
Humboldt	34,958,314	34,164,968	33,793,967	34,742,783
Imperial	17,802,655	21,554,632	25,757,829	29,121,521
Inyo	6,268,862	9,505,223	12,233,464	12,146,953
Kern	73,253,382	80,529,757	85,347,560	88,848,987
Kings	15,356,486	16,021,104	16.237,992	17,682,680
Lake	4,824,106	4,850,106	4,802,733	5,009,380
Lassen	7,431,405	8,338,937	9,336,777	10,385,369
Los Angeles	726,110,668	804,111,796	849,991,595	862,442,180
Madera	14,388,045	14,848,773	15,754,791	16,023,639
Marin	21,003,985	22,020,030	23,460,510	23,446,406
Mariposa	3,567,315	3,608,137	3,643,117	3,681,289
Mendocino	16,334,097	18,147,700	18,380,047	18,316,490
Merced	25,001,574	25,366,168	25,576,932	26,544.868
Modoc	6,691,970	7,709,392	7,972,273	8,068,490
Mono	1,437,518	1,946,359	1,831,331	1,911,797
Monterey	31,769,895	32,702,889	32,363,263	34,572,343
Napa	17,419,458	18,053,729	18,625,240	17,357,532
Nevada	8,100,054	8,060,030	8,226,968	8,347,631
Orange	44,526,688	48,185,593	54,546,951	55,266,628
Placer	13,379,216	12,973,772	12,710,488	14,947,936
Plumas	8,960,958	8,429,018	9,398,811	10,372,910
Riverside	31,532,687	31,984,516	34,005,577	35,189,142
Sacramento	86,589,795	91,000,053	93,464,057	96,406,835
San Benito	8,184,027	8,453,146	9,091,200	9,270,826
San Bernardino	58,285,281	60,176,743	63,345,022	66,239,493
San Diego	59,140,997	73,685,084	75,866,729	76,689,137
San Francisco	605,141,664	624,182,130	647,456,025	656,677,332
San Joaquin	64,715,657	65,557,627	66,368,964	68,421,947
San Luis Obispo	20,207,375	20,662,282	21,157,354	21,652,203
San Mateo	30,739,041	31,692,918	32,465,471	35,986,919
Santa Barbara	32,722,992	33,380,447	34,496,827	35,062,648
Santa Clara	77,987,556	80,072,624	81,008,331	86,666,646
Santa Cruz	19,915,174	20,903,743	21,135,033	20,837,458
Shasta	15,642,300	15,181,888	15,185,419	15,253,691
Sierra	2,394,194	2,428,636	2,395,222	2,516,471
Siskiyou	21,583,145	22,137,012	21,155,790	21,341,008
Solano	24,941,957	25,406,702	26,361,996	26,707,377
Sonoma	40,110,583	40,781,686	41,837,840	41,677,089
Stanislaus	29,878,470	31,158,943	31,843,486	33,193,980
Sutter	9,184,568	12,963,082	13,269,700	13,358,785
Tehama	14,474,792	15,644,158	15,779,193	16,039,723
Trinity	3,052,887	3,088,170	3,166,400	3,400,979
Tulare	45,397,614	46,842,975	48,840,387	52,682,367
Tuolumne	9,885,945	9,946,773	10,110,677	9,559,479
Ventura	30,763,999	30,834,087	30,971,620	32,159,977
Yolo	22,085,786	24,051,914	24,621,651	24.970.716
Yuba	9,493,367	9,898,108	10,200,095	10,510,887
Totals	$2,919,342,889	$3,114,136,640	$3,232,646,152	$3,311,446,744

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*For the figures for 1880 and 1890, see Report for 1912, pages 268–269.

TABLE XLV.

Funded Debt, Total County Indebtedness, and State and County Rate of Taxation Each $100 in 1915.

(From the Report of the State Controller.)

Counties	Funded debt	Floating debt, with estimated interest	Total county indebtedness	Total county rate of taxation on each $100 (no state rate)	
				Inside	Outside
Alameda		$17,842 10	$17,842 10	$ 99	$1 39
Alpine		7,690 85	7,690 85		1 35
Amador				1 60	2 00
Butte				2 95	3 35
Calaveras				1 70	2 10
Colusa	$350,000 00	21,000 00	371,000 00	1 40	1 90
Contra Costa	161,000 00		161,000 00	1 55	1 95
Del Norte		5,960 00	5,960 00	1 70	2 25
El Dorado	120,000 00		120,000 00	2 00	2 40
Fresno				1 28	1 68
Glenn	450,000 00		450,000 00	1 54	1 94
Humboldt				1 80	2 30
Imperial				1 40	2 00
Inyo	42,000 00		42,000 00	1 30	1 60
Kern	1,974,000 00		1,974,000 00	85	1 20
Kings	672,000 00		672,000 00	2 00	2 60
Lake	22,500 00	210 00	22,710 00	1 50	2 10
Lassen	100,000 00		100,000 00	1 44	1 84
Los Angeles	3,400,000 00		3,400,000 00	94	1 34
Madera		3,006 32	3,006 32	1 47	1 87
Marin				1 35	1 75
Mariposa					1 90
Mendocino	60,000 00	1,582 09	61,582 09	1 80	2 40
Merced	20,000 00		20,000 00	1 40	2 00
Modoc				1 40	1 80
Mono					3 00
Monterey	612,000 00		612,000 00	1 49	1 89
Napa				1 48	1 88
Nevada		2,202 42	2,202 42	1 90	2 40
Orange	1,341,000 00		1,341,000 00	1 55	1 95
Placer		1,617 55	1,617 55	1 85	2 25
Plumas	135,100 00		135,100 00		2 00
Riverside	1,265,000 00		1,265,000 00	1 94	2 54
Sacramento	1,485,000 00	41,553 00	1,526,553 00	1 299	1 80
San Benito	291,000 00		291,000 00	2 15	2 40
San Bernardino	1,900,000 00		1,900,000 00	1 75	2 08
San Diego	1,095,000 00		1,095,000 00	1 66	2 36
San Francisco	42,635,800 00		42,635,800 00	2 26	
San Joaquin	1,700,000 00		1,700,000 00	1 50	1 90
San Luis Obispo	70,000 00		70,000 00	1 60	2 20
San Mateo	1,379,000 00	19,269 00	1,398,269 00	1 73	2 23
Santa Barbara				1 65	2 15
Santa Clara	300,000 00		300,000 00	1 26	1 68
Santa Cruz		18,731 31	18,731 31	1 70	2 30
Shasta				2 35	2 75
Sierra				1 75	2 25
Siskiyou				1 50	1 90
Solano	200,000 00		200,000 00	1 57	1 97
Sonoma	256,000 00		256,000 00	1 60	2 00
Stanislaus				1 60	2 00
Sutter				1 75	2 15
Tehama		10,190 77	10,190 77	2 60	3 00
Trinity		769 65	769 65		2 50
Tulare		60,410 38	60,410 38	1 70	2 30
Tuolumne		678 83	678 83	1 66	2 15
Ventura	378,000 00		378,000 00	1 825	2 15
Yolo				1 30	1 90
Yuba		1,500 16	1,500 16	2 70	3 10
Totals	$62,414,400 00	$214,214 43	$62,628,614 43		

TABLE XLVI.

Grand Total Value of All Assessed Property in California, 1850-1915.

(From the Reports of the State Controller's Department.)

Year	Total assessed value of property in California	Year	Total assessed value of property in California
1850	$57,670,689	1883	$765,729,430
1851	49,231,052	1884	821,078,767
1852	64,579,375	1885	859,512,384
1853	95,335,646	1886	817,445,729
1854	111,191,630	1887	956,740,805
1855	103,887,193	1888	1,107,952,700
1856	115,007,440	1889	1,111,550,979
1857	126,059,461	1890	1,101,137,290
1858	125,955,877	1891	1,242.300,434
1859	131,060,279	1892	1,275,678,822
1860	148,193,540	1893	1,216,380,398
1861	147,811,617	1894	1,204,347.291
1862	160,369,071	1895	1,132,512,903
1863	174,104,955	1896	1,264,973,043
1864	179,164,730	1897	1,089,373,316
1865	183,534,312	1898	1,132,230,221
1866	200,368,826	1899	1,193,961,761
1867	212,205,339	1900	1,217,648,863
1868	237,483,175	1901	1,241,359,555
1869	260,563,879	1902	1,290,238,964
1870	277,538,134	1903	1,597,944,240
1871	267,868,126	1904	1,545,698,785
1872	637,232,823	1905	1,624,023,172
1873	428,747,043	1906	1,594,231,577
1874	611,495,197	1907	1,879,950,692
1875	618,083,315	1908	1,990,256,945
1876	595,073,177	1909	2,439,566,433
1877	586,953,022	1910	2,372,944,301
1878	584,578,036	1911	2,602,344,933
1879	549,142,610	1912	2,919,342.889
1880	666,399,985	1913	3,114,136,640
1881	659,835,762	1914	3,232,646,152
1882	608,555,960	1915	3,311,446,744

Summary, 1913-1915.

	1913	1914	1915
Total value of property as returned by auditor	$2,963,022,898 00	$3,075,896,671 00	$3,157,965,465 00
Value of railroads as assessed by State Board of Equalization	151,113,742 00	156,749,481 00	153,481,279 00
Funded debt of counties	47,250,200 00	57,217,400 00	62,414,400 00
Floating debt with estimated interest of counties	96,340 52	136,145 66	214,214 43
Total county indebtedness	47,346,540 52	57,353,545 66	62,628,614 43

CALIFORNIA BANKS.*

(Compiled from the Reports of the Comptroller of the Currency, and the Superintendent of State Banks.)

Total resources and liabilities of all reporting banks in California in 1912 and 1915.

519 state banks on June 14, 1912.
231 national banks on September 4, 1912.

750 banks.

Summary of Resources, 1912.

STATE BANKS.

150 commercial banks.
166 departmental banks.
132 savings banks.
64 branch banks.
7 trust companies.

519

Commercial banks	$199,228,081 33
Savings banks	455,756,885 08
Trust companies	12,013,543 89
Total state banks	$666,998,510 30
Total national banks	501,213,995 00
Grand total	$1,168,212,505 30
Postal savings fund	$464,241 66

Summary of Resources, 1915.

State banks on June 23, 1915	468 banks, and 95 branches
National banks on September 2, 1915	266 banks
Total	734 banks

State Banks, Total Resources 1915.

468 banks.
95 branches.

563

Commercial banks	$197,815,381 06
Savings banks	522,761,190 77
Trust companies	43,108,274 93
Total	$763,684,846 76
Postal savings bank deposits	$1,218,192 14

The total resources of San Francisco with 27 banks and 19 branches in 1915 was $317,334,189.89; Los Angeles, 22 banks and 14 branches, $133,389,514.22; Oakland, 11 banks and 8 branches, $51,142,895.26. On June 23, 1915, there were 468 state banks with 95 branch offices. Of these 126 were commercial, 130 savings, 7 trust, 184 commercial and savings, 17 commercial, savings and trust, 1 commercial and trust and 3 savings and trust. These figures are included in the total.

	June 30, 1914	June 23, 1915	Increase	Decrease
Assets	$714,330,336 89	$728,758,967 94	$14,428,631 05	
Loans and discounts	465,417,351 17	470,979,974 42	5,562,623 25	
Cash on hand	30,548,948 12	27,568,582 04	----------------	$2,980,366 08
Capital	62,173,816 66	62,452,186 66	278,370 00	
Surplus	28,489,063 82	28,568,208 49	79,144 67	
Undivided profits	10,524,715 30	17,003,869 56	6,479,154 26	
Individual deposits	575,557,512 10	581,410,023 79	5,852,511 69	

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*A complete list of all the national and state banks in California, classified by counties, and giving the date of incorporation of each bank, with the totals of the commercial, savings, and trust departments, and total resources of each and every bank by counties, is given in the Statistical Report of the State Board of Agriculture for 1912, pages 272-306.

National Banks in 1915.

On September 2, 1915, there were 266 national banks in the State with total resources amounting to $535,820,643; San Francisco with 9 banks with resources amounting to $257,342,596, and Los Angeles with 9 banks with total resources amounting to $84,898,873, which are included in the above total.

The grand total of all resources of both state and national banks in 1915 was as follows:

State banks (less $32,879,739.99 trust funds)	$730,805,106 77
National banks (248 banks reporting)	535,820,643 59
Total	$1,266,625,750 36

The total increase of resources in state banks since the year 1912 amounts to $63,806,596.47, and the total increase of the resources of national banks during the same period, $34,606,648.59, making a total increase of $98,413,245.06.

The above figures prove the enormous financial resources of the State. The statements of the state and national banks, not being taken on the same day, the combined totals are, of necessity, not exact, but for all practical purposes they are close enough to prove the enormous wealth of California.

In 1912 California was fifth in point of banking strength among the states, being exceeded only by such old states as New York, Pennsylvania, Massachusetts, and Illinois, in the order named. This holds good whether reference is made to capital and surplus, deposits, or total resources, according to the annual report of the Comptroller of the Currency for 1912. In savings bank deposits alone California outranks Illinois, and is exceeded only by New York, Massachusetts, and Pennsylvania. The average amount to each depositor in the different states varies considerably, Nevada taking the lead, but California being a close second, the figures being as follows:

Nevada	$793 17	Southern states	$230 85
California	681 16	Middle Western states	360 33
New England states	411 88	Western states	212 72
Eastern states	493 67	Pacific states	625 18

Bank Clearings of Eight Cities, 1905-1915.

SAN FRANCISCO.

Year	Clearings
1905	$1,834,549,788 51
1906	1,998,400,779 46
1907	2,133,883,625 80
1908	1,757,141,850 08
1909	1,979,872,570 06
1910	2,323,772,870 99
1911	2,427,075,543 46
1912	2,677,561,952 27
1913	2,624,428,824 74
1914	2,516,004,816 78
1915	2,693,688,925 69

SACRAMENTO.

Year	Clearings
1905	
1906	
1907	
1908	$44,628,760 60
1909	54,562,493 31
1910	69,447,281 94
1911	78,376,700 21
1912	92,747,060 69
1913	108,268,688 39
1914	103,286,903 09
1915	101,129,004 87

LOS ANGELES.

Year	Clearings
1905	$478,985,298 40
1906	578,635,516 82
1907	581,803,982 00
1908	505,588,756 02
1909	673,165,728 81
1910	811,387,487 47
1911	922,914,526 09
1912	1,168,941,700 02
1913	1,211,168,979 18
1914	1,145,167,110 19
1915	1,048,090,667 10

FRESNO.

Year	Clearings
1905	
1906	
1907*	
1908	
1909	$29,324,258 30
1910	37,930,473 07
1911	39,782,776 05
1912	51,400,594 73
1913	57,384,801 12
1914	53,442,675 84
1915	53,554,334 98

OAKLAND.

Year	Clearings
1905	
1906*	
1907	$140,416,038 98
1908	76,847,792 99
1909	96,527,088 09
1910	157,380,388 13
1911	172,484,561 60
1912	192,570,346 29
1913	188,730,763 00
1914	176,063,061 82
1915	181,464,620 08

STOCKTON.

Year	Clearings
1905	
1906	
1907*	
1908	$24,415,671 88
1909	28,301,936 22
1910	32,277,582 57
1911	40,350,889 35
1912	44,891,763 06
1913	45,925,831 09
1914	47,257,207 00
1915	50,241,377 00

SAN DIEGO.

Year	Clearings
1905*	
1906	$36,218,236 32
1907	49,194,870 02
1908	37,771,349 22
1909	52,094,521 82
1910	67,173,976 93
1911	86,724,333 47
1912	131,894,087 37
1913	134,145,293 00
1914	103,102,297 90
1915	99,636,940 70

SAN JOSE.

Year	Clearings
1905*	
1906	$10,969,524 94
1907	15,504,767 53
1908	23,246,315 12
1909	25,320,894 50
1910	27,828,978 64
1911	29,877,754 37
1912	35,882,473 55
1913	35,730,898 59
1914	36,344,989 14
1915	34,935,899 53

*Clearing house only organized this year, so the figures for the twelve months are not available.

INSURANCE.

The total number of insurance companies and associations, except fraternal insurance societies, authorized to transact business in the State of California during the year ending December 31, 1912, and 1914 was as follows:

California Companies.

	1912	1914
Stock, fire and marine	5	5
County mutual fire	21	21
Legal reserve life	7	8
Assessment life, health and accident	2	1
Miscellaneous casualty stock	13	14
Interinsurance associations	5	6
Total (California companies)	53	57

Companies of Other States.

	1912	1914
Stock, fire and marine	99	93
Mutual fire and marine	7	9
Legal reserve life	38	42
Assessment life, health and accident	5	3
Stock miscellaneous	52	50
Interinsurance associations	5	9
Fraternals	----------	50
Total (other states)	206	259

Companies of Foreign Countries.

	1912	1914
Stock, fire and marine	42	47
Stock miscellaneous	5	6
Total (foreign)	47	53
Grand total	306	369

SUMMARY OF CAPITAL STOCK, ASSETS, LIABILITIES AND SURPLUS.

The following summary shows the total capital, assets, liabilities and surplus of all life, fire, marine and miscellaneous insurance companies authorized to transact business in California on December 31, 1914:

	California companies	Companies of other states	Companies of foreign countries	Totals
Capital stock (paid up)	$14,143,602 00	$135,097,118 45	----------------	$149,240,720 45
Total admitted assets	64,069,345 88	5,072,829,528 11	$145,072,777 98	5,281,971,651 97
Liabilities (except capital)	44,295,255 07	4,634,473,139 92	93,618,000 30	4,772,386,395 29
Net surplus (except capital)	5,630,488 81	303,259,269 74	51,454,777 68	360,344,536 23
Surplus as regards policyholders	19,774,090 81	438,356,388 19	51,454,777 68	509,585,256 68

Divided as follows:

CALIFORNIA COMPANIES.

	Fire and Marine	Life	Miscellaneous	Totals
Capital stock (paid up)	$2,900,000 00	$3,976,597 00	$7,267,005 00	$14,143,602 00
Total admitted assets	12,766,276 57	39,956,480 33	11,346,588 98	64,069,345 88
Liabilities (except capital)	6,988,938 45	34,295,864 24	3,010,452 38	44,295,255 07
Net surplus (except capital)	2,877,338 12	1,684,019 09	1,069,131 60	5,630,488 81
Surplus as regards policyholders	5,777,338 12	5,660,616 09	8,336,136 60	19,774,090 81

COMPANIES OF OTHER STATES.

	Fire and Marine	Life	Miscellaneous	Totals
Capital stock (paid up)	$77,895,064 70	$19,540,985 00	$37,661,068 75	$135,097,118 45
Total admitted assets	470,353,141 11	4,461,669,670 33	140,806,716 67	5,072,829,528 11
Total liabilities (except capital)	252,002,116 01	4,301,906,779 57	80,564,244 34	4,634,473,139 92
Net surplus (except capital)	140,455,960 40	140,221,905 76	22,581,403 58	303,259,269 74
Surplus as regards policyholders	218,351,025 10	159,762,890 76	60,242,472 33	438,356,388 19

COMPANIES OF FOREIGN COUNTRIES (UNITED STATES BRANCH).

	Fire and Marine	Miscellaneous	Totals
Total admitted assets	$120,688,751 99	$24,384,025 99	$145,072,777 98
Total liabilities	73,077,000 13	20,541,000 17	93,618,000 30
Surplus as regards policyholders	47,611,751 86	3,843,025 82	51,454,777 68

Life Insurance, 1905-1914.

Year	Premiums received	Losses and endorsements paid
1905	$10,550,503 86	$3,400,490 37
1906	10,643,952 00	4,081,162 73
1907	11,017,267 20	4,995,417 25
1908	11,658,903 26	4,343,935 04
1909	12,557,869 31	4,404,398 96
1910	13,501,003 98	4,771,862 70
1911	14,811,167 84	5,719,644 03
1912	16,718,297 79	6,449,765 86
1913	18,454,772 20	6,944,709 28
1914	19,831,311 69	6,913,169 58

Fire Insurance, 1905-1914.

The following summary shows the premiums received and the losses paid in California during the past ten years:

Year	Premiums received	Losses paid
1905	$10,353,808 04	$3,883,540 20
1906	13,368,350 87	*146,306,376 92
1907	16,242,105 95	7,008,035 97
1908	14,442,623 40	5,345,988 35
1909	15,094,210 60	5,795,279 57
1910	15,900,524 11	6,013,426 48
1911	16,154,903 01	4,604,219 19
1912	16,258,040 76	5,569,008 97
1913	15,897,255 09	7,101,298 64
1914	16,564,373 64	6,754,603 76

*Losses owing to the great San Francisco fire.

Marine Insurance, 1905-1914.

Year	Premiums received	Losses paid
1905	$1,581,196 83	$1,463,939 42
1906	1,628,982 01	1,394,987 73
1907	1,885,535 22	1,276,704 91
1908	1,864,861 07	994,487 39
1909	1,952,269 99	1,368,892 35
1910	2,180,135 74	1,689,065 81
1911	2,321,318 35	1,375,225 59
1912	2,667,902 00	779,238 00
1913	2,464,976 07	2,011,324 81
1914	2,594,263 90	1,408,158 97

Industrial Life Insurance, 1905-1914.

Year	Premiums received	Losses paid
1905	$725,705 69	$175,854 95
1906	810,355 30	213,436 29
1907	845,188 77	212,701 78
1908	920,464 73	225,829 95
1909	1,058,790 00	275,574 95
1910	1,285,416 24	305,356 64
1911	1,466,604 96	354,320 28
1912	1,724,786 67	420,678 02
1913	1,943,320 96	509,252 59
1914	2,201,025 05	556,374 33

Fraternal Societies, 1914.

The following table shows the total business transacted by all fraternal societies transacting business in California on December 31, 1914:

	Number	Amount
Certificates in force December 31, 1913	4,240,167	$5,774,531,823 85
Certificates issued, transferred or increased in 1914	550,204	641,454,022 50
Certificates terminated or decreased during 1914	453,241	546,890,875 75
Certificates in force December 31, 1914	4,337,130	5,869,094,970 60
Total claims paid during 1914	----------	58,509,830 38

The following table shows the California business of fraternal societies for the year ending December 31, 1914:

	Number	Amount
Certificates in force December 31, 1913	159,037	$224,508,753 60
Certificates issued, transferred or increased in 1914	28,531	27,994,552 50
Certificates terminated during 1914	26,063	30,821,064 00
Certificates in force December 31, 1914	161,505	221,682,242 10

Received from members in California	$3,188,089 92
Losses and claims paid in California	2,160,061 71

APPENDIX A*

CALIFORNIA STATE BOARD OF AGRICULTURE.

State Board of Agriculture and Agricultural Experiment Stations in the United States.

STALLION REGISTRATION BOARDS.

State Boards of Agriculture and Experiment Stations.

There are 43 official bodies or organizations in the United States charged with the promotion of agriculture. Of these 20 are "State Boards of Agriculture"; 19 are governed by a "Commissioner of Agriculture"; 3, California, Georgia and Minnesota, have a "State Agricultural Society," and Pennsylvania a "Secretary of Agriculture." Of the above, California is the only one with a dual title, that of the "State Agricultural Society" and "State Board of Agriculture." There are also 60 agricultural experiment stations, conducted, in most cases, under the authority of the state universities.

The first agricultural experiment stations were formed some forty years ago, one of the pioneers being that of the State University at Berkeley in 1873. They were subsequently reorganized under the Hatch Act of 1887, which largely extended the number of these most valuable institutions.

Stallion Registration Boards.

The first law regulating the registration of stallions was passed by the state of Wisconsin in 1906, since which time nineteen other states have taken this important step to improve the breed of their horses.

California State Agricultural Society.

(Incorporated May 13, 1854. State Board of Agriculture created March 12, 1863.)

The California State Agricultural Society was one of the first to be organized, and ranks as fifth in the United States.

The first State Fair was held in the Music Hall at San Francisco from the 4th to about the 12th of October, 1854, and the stock show was held on the Pioneer race course. A fair has been held annually ever since in 1855 at Sacramento, 1856 at San Jose, 1857 at Stockton, 1858 at Marysville, and since then at Sacramento, except in 1915, when it was omitted on account of the Panama Pacific International Exposition at San Francisco.

The amount distributed in premiums and purses for the promotion of agriculture, the encouragement of live stock breeding and of other California industries during this period is upward of $1,600,000.

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*For a list of states having Agricultural Associations, Animal Pedigree Registry Societies, Fruit Associations, Agricultural Newspapers, State and District Fairs, see Report for 1915, pages [illegible].

CALIFORNIA STATE FAIRS, 1854-1916.

Year	Place	Date	Premiums	Races	Total	President
1854	San Fran.	Oct. 4	$4,000	$	$4,000	F. W. Macondry, San Fran.
1855	Sacramento	Sept. 25-Oct. 1	6,250		6,250	C. T. Hutchinson, Sac'to.
1856	San Jose	Oct. 7-10	6,746		6,746	F. L. Beard, Alameda.
1857	Stockton	Sept. 28-Oct. 2	7,981		7,981	C. M. Weber,* Stockton.
1858	Marysville	Aug. 23-28	7,435		7,435	John C. Fall, Marysville.
1859	Sacramento	Sept. 15-22	8,139		8,139	C. T. Hutchinson, Sac'to.
1860	Sacramento	Sept. 15-22	8,827		8,827	T. G. Phelps, San Mateo.
1861	Sacramento	Sept. 16-21	7,231		7,231	Jerome C. Davis, Yolo Co.
1862	Sacramento	Aug. 31-Sept. 4			3,990	A. Haraszthy, Sonoma.
1863	Sacramento	Sept. 25-Oct. 3	4,434		4,434	Judge Isaac Davis, Yolo Co.
1864	Sacramento	Oct. 17-22	6,105		6,105	C. F. Reed, Grafton, Yolo Co.
1865	Sacramento	Sept. 18-23	10,622		10,622	C. F. Reed, Grafton, Yolo Co.
1866	Sacramento	Sept. 10-15	9,742		9,742	C. F. Reed, Grafton, Yolo Co.
1867	Sacramento	Sept. 9-14	9,954		9,954	C. F. Reed, Grafton, Yolo Co.
1868	Sacramento	Sept. 15-25			10,000	C. F. Reed, Grafton, Yolo Co.
1869	Sacramento	Sept. 6-11				C. F. Reed, Grafton, Yolo Co.
1870	Sacramento	Sept. 12-17			20,000	C. F. Reed, Grafton, Yolo Co.
1871	Sacramento	Sept. 18-23			40,000	C. F. Reed, Grafton, Yolo Co.
1872	Sacramento	Sept. 19-28			20,000	C. F. Reed, Grafton, Yolo Co.
1873	Sacramento	Sept. 15-20	8,925	14,200	23,125	R. S. Carey, Yolo.
1874	Sacramento	Sept. 21-28	9,619	15,950	25,569	R. S. Carey, Yolo.
1875	Sacramento	Sept. 15-26	9,214	13,330	22,544	R. S. Carey, Yolo.
1876	Sacramento	Sept. 18-23				R. S. Carey, Yolo.
1877	Sacramento	Sept. 17-22				Marion Biggs, Butte.
1878	Sacramento	Sept. 16-21	10,965	13,775	24,740	Marcus D. Boruck, San Fran.
1879	Sacramento	Sept. 8-13		12,260	12,260	Hugh M. Larue, Sacramento.
1880	Sacramento	Sept. 20-25	6,502	14,885	21,387	Hugh M. Larue, Sacramento.
1881	Sacramento	Sept. 19-24	6,603	12,525	19,128	J. M. McShafter, San Fran.
1882	Sacramento	Sept. 11-16	8,651	14,262	22,913	Hugh M. Larue, Sacramento.
1883	Sacramento	Sept. 10-15	8,915	14,005	22,920	P. A. Fingan, Alameda.
1884	Sacramento	Sept. 8-20	11,467	23,165	34,632	P. A. Fingan, Alameda.
1885	Sacramento	Sept. 10-19	13,612	25,145	38,757	Jesse D. Carr, Salinas.
1886	Sacramento	Sept. 9-18	13,370	22,900	36,270	Jesse D. Carr, Salinas.
1887	Sacramento	Sept. 15-24	14,538	23,470	38,008	L. U. Shippee, Stockton.
1888	Sacramento	Sept. 6-15	14,256	25,560	39,816	L. U. Shippee, Stockton.
1889	Sacramento	Sept. 12-21	17,056	30,860	47,916	Christopher Green, Sac'to.
1890	Sacramento	Sept. 11-20	15,761	27,016	42,777	Christopher Green, Sac'to.
1891	Sacramento	Sept. 8-19	17,628	30,081	47,709	Frederick Cox, Sacramento.
1892	Sacramento	Sept. 5-17	17,106	29,950	47,056	Frederick Cox, Sacramento.
1893	Sacramento	Sept. 4-16	13,244	32,715	45,959	John Boggs, Princeton, Colusa Co.
1894	Sacramento	Sept. 3-15	13,447	29,220	42,667	John Boggs, Princeton, Colusa Co.
1895	Sacramento	Sept. 2-14	11,416	32,880	44,296	C. M. Chase, San Francisco.
1896	Sacramento	Sept. 1-19	12,971	47,222	60,193	C. M. Chase, San Francisco.
1897	Sacramento	Sept. 6-18	20,252	35,247	55,499	C. M. Chase, San Francisco.
1898	Sacramento	Sept. 5-17	20,163	28,170	48,333	A. B. Spreckels, San Fran.
1899	Sacramento	Sept. 4-16	10,529	38,745	49,274	A. B. Spreckels, San Fran.
1900	Sacramento	Sept. 3-15	9,768	38,745	48,513	A. B. Spreckels, San Fran.
1901	Sacramento	Sept. 2-14	8,974	30,355	39,329	A. B. Spreckels, San Fran.
1902	Sacramento	Sept. 8-20	15,000	40,280	55,280	A. B. Spreckels, San Fran.
1903	Sacramento	Aug. 31-Sept. 12	15,000	31,435	46,435	Benjamin F. Rush, Suisun.
1904	Sacramento	Aug. 22-Sept. 3	15,000	28,597	43,957	Benjamin F. Rush, Suisun.
1905	Sacramento	Sept. 2-9	6,656	24,419	31,075	Benjamin F. Rush, Suisun.
1906	Sacramento	Aug. 25-Sept. 1	7,598	10,640	18,640	Benjamin F. Rush, Suisun.
1907	Sacramento	Sept. 2-14	11,153	14,914	26,067	Benjamin F. Rush, Suisun.
1908	Sacramento	Aug. 29-Sept. 5	11,277	13,410	24,687	H. A. Jastro, Bakersfield.
1909	Sacramento	Aug. 28-Sept. 4	14,183	14,665	28,848	H. A. Jastro, Bakersfield.
1910	Sacramento	Sept. 3-10	14,465	6,930	21,395	H. A. Jastro, Bakersfield.
1911	Sacramento	Aug. 26-Sept. 2	14,790	26,300	41,090	A. L. Scott, San Francisco.
1912	Sacramento	Sept. 14-21	20,000	17,000	37,000	A. L. Scott, San Francisco.
1913	Sacramento	Sept. 13-20	25,000	37,000	62,000	A. L. Scott, San Francisco.
1914	Sacramento	Sept. 12-19	18,609	37,000	55,609	A. L. Scott, San Francisco.
1915	Sacramento	†				John M. Perry, Stockton.
1916	Sacramento	Sept. 2-9	41,536	16,500	58,036	John M. Perry, Stockton.

*Resigned March 10th. Wm. Garrard appointed.

†No fair owing to the Panama Pacific Exposition at San Francisco.

Many of the books and records of the Society were destroyed by a disastrous flood on the 9th of December, 1861, and 9th of January, 1862, caused by a break in the levee on the north side of Sacramento.

STATE BOARDS OF AGRICULTURE AND DEPARTMENTS OF AGRICULTURE IN THE UNITED STATES (43).*

State	Description and location	Organized
Alabama	Commissioner of Agriculture, Montgomery	1888
Arkansas	Commissioner of Agriculture, Little Rock (Society)	1898
California	State Board of Agriculture	1854
Colorado	State Board of Agriculture, Fort Collins	1877
Connecticut	Commissioner of Agriculture, Hartford	1866
Delaware	State Board of Agriculture, Dover	1901
Florida	Commissioner of Agriculture, Tallahassee	1889
Georgia	Georgia State Agricultural Society, Experiment	1846
Georgia	Commissioner of Agriculture, Atlanta	1874
Idaho	Commissioner of Immigration, Labor and Statistics, Boise	1900
Illinois	State Board of Agriculture, Springfield	1853
Indiana	State Board of Agriculture, Indianapolis	1851
Iowa	State Board of Agriculture, Des Moines	1900
Kansas	State Board of Agriculture, Topeka	1862
Kentucky	Commissioner of Agriculture, Frankfort	1892
Louisiana	Commissioner of Agriculture, Baton Rouge	1880
Maine	Commissioner of Agriculture, Augusta	1855
Massachusetts	State Board of Agriculture, Boston	1852
Michigan	State Board of Agriculture, East Lansing	1881
Minnesota	State Agricultural Society, Hamline	1854
Mississippi	Commissioner of Agriculture, Jackson	1907
Missouri	State Board of Agriculture, Columbia	1865
Montana	Commissioner of Agriculture (Bureau of Agriculture, Labor, Industry and Publicity), Helena	1889
Nebraska	State Board of Agriculture, Lincoln	1858
Nevada	State Board of Agriculture, Carson City	----------
New Hampshire	State Board of Agriculture, Concord	1870
New Jersey	State Board of Agriculture, Trenton	1873
New York	Commissioner of Agriculture, Albany	1893
North Carolina	Commissioner of Agriculture, Raleigh	1877
North Dakota	Commissioner of Agriculture, Bismarck	1889
Ohio	State Board of Agriculture, Columbia	1846
Oklahoma	State Board of Agriculture, Stillwater	1907
Oregon	State Board of Agriculture, Salem	1861
Pennsylvania	Secretary of Agriculture, Harrisburg	1895
Rhode Island	State Board of Agriculture, Providence	1892
South Carolina	Commissioner of Agriculture, Columbia	1904
South Dakota	State Board of Agriculture, Huron	1884
Tennessee	Commissioner of Agriculture, Nashville	1875
Texas	Commissioner of Agriculture, Austin	1906
Vermont	Commissioner of Agriculture, Plainfield	1872
Virginia	Commissioner of Agriculture, Richmond	1888
West Virginia	Commissioner of Agriculture, Charleston	1891
Wisconsin	State Board of Agriculture, Madison	1897

*Not including Alaska, Guam, Hawaii, Philippine Islands and Porto Rico.

AGRICULTURAL EXPERIMENT STATIONS (60*).

State	Description and location	Date of original organization	Organized under Hatch Act of March 2, 1887
Alabama	(College) Auburn	1872	Feb. 24, 1888
Alabama	(Canebrake) Uniontown	1885	Apr. 1, 1888
Alabama	(Tuskegee Institute) Tuskegee	Feb. 15, 1897	
Arizona	(State University of Tucson)	1885	1890
Arkansas	Fayetteville		Mar. 7, 1889
California	(State University) Berkeley	1873	Mar., 1888
Colorado	Fort Collins		Feb., 1888
Connecticut	(State) New Haven	Mar. 21, 1877	May 18, 1887
Connecticut	(Storrs) Storrs		May 18, 1887
Delaware	Newark		Feb. 21, 1888
Florida	Gainesville		1888
Georgia	Experiment	1888	July 1, 1889
Idaho	Moscow		Feb. 26, 1892
Illinois	Urbana		Mar. 21, 1888
Indiana	Lafayette		Jan. 1, 1888
Iowa	Ames		Feb. 17, 1888
Kansas	Manhattan		Feb. 8, 1888
Kentucky	Lexington	Sept. 25, 1885	Apr., 1888
Louisiana	(Sugar) New Orleans	Sept., 1886	1888
Louisiana	(State) Baton Rouge	Apr., 1887	
Louisiana	(North) Calhoun	May, 1887	July 1, 1909
Louisiana	(Rice) Crowley		
Maine	Orono	Mar., 1885	Oct. 1, 1887
Maryland	College Park		Mar. 9, 1888
Massachusetts	Amherst	1882	Mar. 2, 1888
Michigan	East Lansing		Feb. 26, 1888
Minnesota	(University Farm) St. Paul	Mar. 7, 1885	1888
Mississippi	(Agricultural College)		Jan. 27, 1888
Missouri	(College) Columbia		Jan., 1888
Missouri	(Fruit) Mountain Grove	Feb. 1, 1900	
Montana	Bozeman		Feb. 16, 1893
Nebraska	Lincoln	Dec. 16, 1884	June 14, 1887
Nevada	Reno		Dec., 1887
New Hampshire	Durham		Aug. 4, 1887
New Jersey	(State) New Brunswick	Mar. 10, 1880	
New Jersey	(College) New Brunswick		Apr. 26, 1888
New Mexico	(College of Agriculture) State College		Dec. 14, 1889
New York	(State) Geneva	Mar. 1, 1882	
New York	(Cornell University) Ithaca	1879	Apr. 1, 1888
North Carolina	(College) West Raleigh	Mar. 12, 1877	Mar. 7, 1887
North Carolina	(State) Raleigh	July 1, 1907	
North Dakota	(Agricultural College)		Mar., 1890
Ohio	Wooster	Apr. 25, 1882	Apr. 2, 1888
Oklahoma	Stillwater		1891
Oregon	Corvallis		July, 1888
Pennsylvania	(State College)		June 30, 1887
Pennsylvania	Institute of Animal Nutrition		July 1, 1907
Rhode Island	Kingston		July 30, 1888
South Carolina	(Clemson College)		Jan., 1888
South Dakota	Brookings		Mar. 13, 1887
Tennessee	Knoxville	June 8, 1882	Aug. 4, 1887
Texas	(College Station)		Jan. 25, 1888
Utah	Logan		Apr., 1890
Vermont	Burlington		Feb. 28, 1888
Virginia	(College) Blackburg		Oct. 16, 1888
Virginia	(Truck) Norfolk	Feb., 1907	
Washington	Pullman		1892
West Virginia	Morgantown		1887
Wisconsin	Madison	1883	1887
Wyoming	(State University) Laramie		Mar. 1, 1891

*Not including Alaska, Guam, Hawaii, Philippine Islands, and Porto Rico.

APPENDIX B.

Temperature, Rainfall and Snowfall in Each County in 1915.

(Compiled from the Report of the United States Weather Bureau, San Francisco.)

Counties	County seat or observation station	Elevation	Temperature		Rainfall, inches	Snowfall, inches
			Highest	Lowest		
Alameda	Oakland*	36	85	30	28.26	T.
Alpine	Tamarack	8,000	------	------	37.10	------
Amador	Ione	287	105	24	20.32	0
Butte	Oroville* (near)	250	110	21	39.36	3.0
Calaveras	Mokelumne Hill	1,550	103	25	35.40	2.0
Colusa	Colusa*	60	105	23	19.59	0
Contra Costa	Antioch	46	106	29	15.34	0
Del Norte	Crescent City*	125	89	26	83.55	0
El Dorado	Placerville*	1,875	100	20	41.07	2.0
Fresno	Fresno*	293	109	24	11.65	0
Glenn	Willows*	136	112	26	27.38	0
Humboldt	Eureka*	64	72	28	39.79	0
Imperial	Calexico	0	117	28	2.76	0
Inyo	Independence*	3,907	98	10	3.00	3.0
Kern	Bakersfield*	404	115	26	9.04	T.
Kings	Hanford*	249	------	------	------	------
Lake	Upper Lake	1.350	------	------	------	------
Lassen	Susanville*	4,175	99	3	------	------
Los Angeles	Los Angeles*	293	99	38	16.67	T.
Madera	Storey	296	107	21	12.63	0
Marin	Point Reyes	490	77	34	24.85	0
Mariposa	Yosemite	3,945	------	10	35.51	83.3
Mendocino	Ukiah*	620	108	20	50.69	0
Merced	Merced*	173	108	21	12.65	0
Modoc	Alturas*	4,400	103	—10	9.98	31.5
Mono	Bridgeport*	6,500	90	—20	9.57	79.3
Monterey	Monterey	15	------	28	24.17	0
Napa	Napa*	60	------	------	------	------
Nevada	Nevada City*	2,850	101	12	60.24	15.5
Orange	Yorba Linda	405	104	23	14.94	0
Placer	Auburn*	1,360	103	22	29.52	0
Plumas	Quincy*	3,400	98	6	29.13	47.5
Riverside	Riverside*	851	108	27	15.80	T.
Sacramento	Sacramento*	71	105	24	17.74	0
San Benito	Hollister*	284	97	22	17.10	T.
San Bernardino	San Bernardino*	1,054	108	27	20.65	2.0
San Diego	San Diego*	87	91	38	13.62	0
San Francisco	San Francisco*	207	86	36	28.27	0
San Joaquin	Stockton (S. H.)*	23	100	24	17.04	0
San Luis Obispo	San Luis Obispo*	201	97	29	25.89	0
San Mateo	Redwood City*	------	------	------	------	------
Santa Barbara	Santa Barbara*	130	98	34	21.42	0
Santa Clara	San Jose*	95	97	23	21.72	0
Santa Cruz	Santa Cruz*	20	92	23	34.69	0
Shasta	Redding*	552	111	22	57.96	T.
Sierra	Downieville*	3,150	104	12	75.94	45.6
Siskiyou	Dunsmuir	2,285	105	18	65.30	36.5
Solano	Suisun	20	104	26	19.63	0
Sonoma	Santa Rosa*	181	103	18	42.30	0
Stanislaus	Modesto*	90	106	18	13.22	0
Sutter	Yuba City*	57	------	------	------	------
Tehama	Red Bluff*	307	110	28	36.15	0
Trinity	Weaverville*	2,162	105	9	47.78	10.5
Tulare	Porterville	464	111	28	13.33	T.
Tuolumne	Jamestown	1,471	------	------	------	------
Ventura	Ojai Valley	900	104	25	23.56	0
Yolo	Davis	51	112	22	21.02	0
Yuba	Marysville*	67	110	20	27.90	0

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*County seat. Where there is no observation station at the county seat, some other station is given. There is no observation station in Kings, Lake, Napa, San Mateo, Sutter or Tuolumne counties. In the last named the figures for Yuba may be accepted as correct, as Marysville is on the opposite side of the river.

The snowfall in the mountains is more or less heavy; it rarely falls in the Sacramento and San Joaquin valleys. At Summit, in Placer County, 398.5 inches of snow fell, and at Cisco, in the same county, 395.7 inches of snow were recorded in 1915.

In the few counties where the temperature or rainfall is not given, it is either because there is no observation station in the county, or the returns for some cause are incomplete.

General Summary. From the point of view of the weather, 1915 was a favorable year in California. Though the temperature of the State as a whole was 1.1 degree below the normal, the precipitation was 7 inches, or 26 per cent above the average, and the greatest since 1909. The dry season began later and ended later than usual. But 7 per cent of the total annual precipitation fell during the half-year June to November, inclusive. The snowfall in the mountains was above the normal during the spring months, and furnished ample water during the prolonged drought for both irrigation and power purposes. The last three days of December brought the coldest weather in several years, and was accompanied by a light snowfall in many places where snow rarely falls. Severe storms and destructive gales were of frequent occurrence during the first three months of the year. While they did considerable damage locally in exposed places along the coast, they did no damage to shipping other than to delay schedules. No violent storms occurred during the autumn months, though that of December 2-4 was accompanied by strong southerly gales and a rainfall which established a new record in the central portion of the State.

From an agricultural standpoint, the weather of 1915 was entirely satisfactory. The ample precipitation, excessive during February and May, supplemented by the usual abundant sunshine, made possible one of the best yields in recent years. Though numerous killing frosts occurred, they came, in most places, at a time when vegetation was in the dormant state, and hence did no material damage. Hot, northerly, desiccating winds did some damage locally in the interior valleys during the spring months. The loss from floods was inconsiderable. The copious and widespread rains which fell in December were readily absorbed by the ground, and the agricultural outlook at the end of the year was most encouraging.

SUPPLEMENT

SUMMARY OF THE RESOURCES

OF THE

STATE OF CALIFORNIA

BY COUNTIES.

The brief description of each county which follows, has been greatly condensed in order to keep it within the space available.

County statistics were first obtained under an act passed in 1905, under which county statisticians were appointed, but the result was a failure, as many counties omitted to supply the figures required, and therefore no complete statistics for the State as a whole could be published. In 1910 eleven counties failed to make any report, and in other years the number was even greater.

In 1911 county statisticians were abolished, and the present system established, under which the cost of gathering statistics was reduced from upwards of $50,000 per annum to $5,000; the latter sum, however, is too small to give entirely satisfactory results, or to make the details as complete as they might be made with a comparatively small increase in the expenditure.

The brief description of each county which follows was originally supplied by the county boards of supervisors under the act of 1905, but has since been revised with the aid of local authorities.

Three counties having objected last year that the statistics given were too conservative, and below the actual facts, an opportunity was offered to all of them to supply their own estimate of the population and resources of their respective counties. Out of the fifty-eight counties of the State, only seventeen responded, most of them stating that they could add nothing of value, and the information in some cases consisted only of cuttings from local newspapers. This information is now included in the County Summary under a separate heading, quoting the authority.

The size of farms, number of animals, and the figures relating to crops, fruit trees, and irrigation are those given in the last census, but later statistics brought down to 1915, are given in the body of the Report under their respective headings.

Some correspondents think that all the details contained in the census reports should be revised annually, but they do not realize the magnitude of the undertaking, or the enormous labor and expense it would entail; and that without any actual benefit, for as a rule the totals do not vary greatly in a single year. The pay of the enumerators alone in this State, at the last census, amounted to $151,750.

The source of the statistics contained in this report are the most trustworthy that can be obtained, and the number of farm animals, farm crops, fruits, and all other products, are brought down to date, and when estimated, the figures are strictly conservative.

ALAMEDA COUNTY.

Date of creation, March 25, 1853.

		1890	1900	1910
Land area 732 square miles.	Population	93,864	130,197	246,131
County seat, Oakland.	Population	48,682	66,960	150,174
Population per square mile, 336.2.				

	Highest	Lowest		Inches		Inches
Elevation, 36 feet. 1915: Temperature	85	30	Rainfall	28.26	Snow	T

Alameda County fronts on the bay of San Francisco for a distance of 38 miles, with an average width of 25 miles, extending to and beyond the summit of the Contra Costa hills, comprising numerous beautiful valleys, besides the broad Alameda Valley, which last is bounded by the waters of the bay on the one side and the Contra Costa hills on the other, and is one of the richest and most fertile valleys in the State. The principal stream is Alameda Creek. There are other creeks crossing the county and emptying into the bay, two of which furnish water for the city of Oakland. The country around Hayward is one of the great fruit-raising regions, many millions of pounds being shipped annually.

The soils immediately along the bay in Alameda County and the marshes formed by the overflow are heavy, but very fertile when reclaimed. Then comes a broad belt of rich, black adobe that is crossed by deposits of alluvium made by shifting channels of streams running down from the Coast Range. In the Niles region are lighter loams. About Livermore are uplands, bench, and valley lands. The Pleasanton section consists of agricultural and grazing lands. The soil is a very rich sediment, producing hay, grain, potatoes, hops, and beets in abundance. At Alvarado the surrounding country is a fine farming and fruit region, and gardening and dairying are largely carried on.

Alameda County was among the first to begin the planting of orchards and vineyards. The county is divisible into three sections—the cherry district, the apricot district, and the vineyard district.

Alameda is *par excellence* a vegetable-producing county, since the profit in peas, potatoes, tomatoes, rhubarm, asparagus, and several other vegetables is large. Many acres in this county are planted in tomatoes, which prove to be a most profitable crop.

The growing of peas for canning has assumed importance. The output of the San Leandro cannery, located in this county, has reached as high as 1,200 cases per day, and 3½ tons of peas have been grown upon a single acre.

The average annual output of salt recovered from San Francisco Bay, in Alameda County, is very large, including both coarse and fine salt.

ALAMEDA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	148
3 to 9 acres	589
10 to 19 acres	405
20 to 49 acres	424
50 to 99 acres	204
100 to 174 acres	238
175 to 259 acres	116
260 to 499 acres	163
500 to 999 acres	91
1,000 acres and over	44
Total	2,422
Total in 1900	2,787

Land and Farm Areas.

Approximate land, acres	468,480
Land in farms in 1910	311,327
Land in farms in 1900	398,289
Improved land in farms in 1910	177,314
Improved land in farms in 1900	226,118
Woodland in farms	51,484
Other unimproved land	82,529

Value of all Farm Property.

Total value in 1910	$36,840,669
Total value in 1900	34,619,536
Per cent increase, 1900-1910	6.4
Land in 1910	29,537,208
Land in 1900	28,751,590
Buildings in 1910	4,463,555
Buildings in 1900	3,485,310
Implements and machinery in 1910	817,861
Implements and machinery in 1900	780,040
Domestic animals, poultry and bees in 1910	2,022,045
Domestic animals, poultry and bees in 1900	1,602,596

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	9,172
Other cows	5,827
Yearling heifers	2,609
Calves	4,113
Yearling steers and bulls	1,107
Other steers and bulls	1,491
Total	24,319
Value	$611,907
Horses—	
Mature horses	9,266
Yearling colts	842
Spring colts	536
Total	10,644
Value	$1,151,631
Mules—	
Mature mules	223
Yearling colts	4
Total	227
Value	$28,545
Asses and burros—	
Number	3
Value	$48
Swine—	
Mature hogs	3,640
Spring pigs	2,770
Total	6,410
Value	$55,333
Sheep—	
Rams, ewes and wethers	5,680
Spring lambs	3,507
Total	9,187
Value	$32,559
Goats—	
Number	64
Value	$321
Total value all domestic animals	$1,880,344
Poultry and bees—	
Poultry of all kinds	240,914
Value	$139,589
Colonies of bees	610
Value	$2,112

Principal Crops.

Description	Acres	Bushels
Corn	503	13,097
Oats	1,725	53,745
Wheat	1,075	21,535
Barley	12,650	473,575
Kafir corn and milo maize	-----	10
Dry edible beans	86	2,933
Potatoes	1,655	175,920

Hay and forage—	Acres	Tons
Timothy and clover mixed	84	115
Clover alone	407	472
Alfalfa	1,109	3,514
Other tame or cultivated grasses	5,202	8,060
Wild, salt, or prairie grasses	729	1,030
Grains cut green	73,041	99,538
All other hay and forage	163	805
Total	80,735	113,534

Poultry products—	
Poultry raised, number	230,417
Eggs produced, dozen	1,391,728
Value poultry and eggs produced	$471,769
Honey and wax—	
Honey produced, pounds	9,848
Wax produced, pounds	179
Value of honey and wax produced	$1,321
Wool—	
Wool, fleeces shorn	5,783
Value wool and mohair produced	$4,930
Special crops—	
Potatoes, acres	1,655
Sweet potatoes, acres	2
All other vegetables, acres	7,459
Sugar beets, acres	2,516

ALAMEDA COUNTY SUMMARY—Continued.

Orchard fruits—	Number bearing trees
Apples	26,045
Apricots	270,461
Cherries	89,284
Peaches and nectarines	12,555
Pears	70,382
Prunes and plums	157,981
Total	627,824
Tropical fruit—	
Figs	482
Lemons	660
Oranges	3,782
Pomeloes	4
Olives	10,963
Total	15,900
Grapevines—	
Number in bearing	2,390,959
Small fruits—	
Strawberries, acres	18
Blackberries and dewberries, acres	12
All others, acres	371
Total	401
Nuts—	Number bearing trees
Almonds	21,190
Pecans	5
Walnuts	3,726
Total	25,250

Irrigation.

Number of farms irrigated in 1909	50
Acres irrigated in 1909	1,859
Acreage enterprises were capable of irrigating in 1910	1,872
Acreage included in projects	2,605
Main ditches, number	49
Length, miles	21
Pumped wells, number	56
Cost of irrigation enterprises up to July 1, 1910	$57,156
Average cost per acre irrigation enterprises were capable of irrigating in 1910	20.5

Mineral Production in 1914.

	Amount	Value
Brick, thousand	22,668	$159,205
Clay, tons	5,000	1,000
Limestone, tons	50	250
Magnesite, tons	150	1,500
Miscellaneous stone	-----	381,135
Pyrite, tons	9,829	34,696
Salt, tons	126,983	292,641
Total		$870,427

Manufactures in 1914.

ALAMEDA.

The population of Alameda at the census of 1910 was 23,383, and it is estimated that it was 26,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

The salaries and wages amounted to $1,239,000 in 1914, and to $966,000 in 1909, the increase being $273,000, or 28.3 per cent.

The number of salaried employees was 127 in 1914, as compared with 111 in 1909, making an increase of 16, or 14.4 per cent.

The average number of wage-earners was 1,092 in 1914, and 915 in 1909, the increase being 177, or 19.3 per cent.

A comparative summary for the city for 1909 and 1914 follows:

Alameda	Census—		Per cent of increase. 1909-1914
	1914	1909	
Number of establishments	53	51	----------
Persons engaged in manufactures	1,267	1,076	17.8
Proprietors and firm members	48	50	----------
Salaried employees	127	111	14.4
Wage-earners (average number)	1,092	915	19.3
Primary horsepower	3,493	1,526	128.9
Capital	$3,737,000	$3,002,000	24.5
Services	1,239,000	966,000	28.3
Salaries	210,000	170,000	23.5
Wages	1,029,000	796,000	29.3
Materials	1,005,000	929,000	8.2
Value of products	2,794,000	2,554,000	9.4
Value added by manufacture (value of products less cost of materials)	1,789,000	1,625,000	10.1

BERKELEY.

The population of Berkeley at the census of 1910 was 40,434, and it is estimated that it was 52,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufacturers have increased since 1909.

The salaries and wages amounted to $1,513,000 in 1914 and to $1,094,000 in 1909, the increase being $419,000, or 38.3 per cent.

The number of salaried employees was 318 in 1914, as compared with 221 in 1909, making an increase of 97, or 43.9 per cent.

The average number of wage-earners was 1,328 in 1914 and 1,084 in 1909, the increase being 244, or 22.5 per cent.

A comparative summary for the city for 1909 and 1914 follows:

Berkeley	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	95	84	----------
Persons engaged in manufactures	1,724	1,420	21.4
Proprietors and firm members	78	115	----------
Salaried employees	318	221	43.9
Wage-earners (average number)	1,328	1,084	22.5
Primary horsepower	3,503	2,433	44.0
Capital	$5,814,000	$3,465,000	67.8
Services	1,513,000	1,094,000	38.3
Salaries	459,000	254,000	80.7
Wages	1,054,000	840,000	25.5
Materials	4,769,000	2,687,000	77.5
Value of products	7,321,000	4,435,000	65.1
Value added by manufacture (value of products less cost of materials)	2,552,000	1,748,000	46.0

OAKLAND.

The population of Oakland at the census of 1910 was 150,174, and it is estimated that it was 183,000 on July 1, 1914.

The statistics represent the establishments located with the corporate limits of the city and show that the manufactures have increased since 1909. In the order of their importance, from a percentage standpoint, the increases for the several items rank as follows: Capital, 90.5 per cent; primary horsepower, 38.5 per cent; salaried employees, 32.3 per cent; salaries, 30.7 per cent; number of establishments, 29.9 per cent; value added by manufacture, 28.8 per cent; value of products, 27.7 per cent; materials, 26.6 per cent; wages, 12.2 per cent; wage-earners, 11.4 per cent; and proprietors and firm members, 4.5 per centt.

A comparative summary for the city for 1909 and 1914 follows:

Oakland	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	573	441	29.9
Persons engaged in manufactures	9,699	8,538	13.6
Proprietors and firm members	579	554	4.5
Salaried employees	1,428	1,079	32.3
Wage-earners (average number)	7,692	6,905	11.4
Primary horsepower	18,950	13,683	38.5
Capital	$36,411,000	$19,113,000	90.5
Services	7,667,000	6,618,000	15.9
Salaries	1,701,000	1,301,000	30.7
Wages	5,966,000	5,317,000	12.2
Materials	14,999,000	11,847,000	26.6
Value of products	28,522,000	22,343,000	27.7
Value added by manufacture (value of products less cost of materials)	13,523,000	10,496,000	28.8

ALPINE COUNTY.

Date of creation. March 16, 1864; reorganized in 1900.

Land area, 776 square miles.
County seat, Markleeville. Township No. 1. Population 309
Population per square mile, 0.4.

Tamarack (Station):		Highest	Lowest		Inches		Inches
Elevation, 8,000 feet.	1915: Temperature	*	*	Rainfall	37.10	Snow	--

Alpine County is one of the counties on the eastern border, and out of the way, as far as her means of communication with the other counties of the State is concerned, there being no public road maintained to the border, thereby rendering it necessary to turn to the state of Nevada for a route to reach the capital at Sacramento, or any other part of the State. This condition militates against the development of Alpine County's many natural resources, as intending investors or purchasers are not afforded a convenient route of reaching the county.

The resources of Alpine County are great, especially in mineral, timber, and water power, the latter offering a field of immediate development to enterprising capital.

ALPINE COUNTY SUMMARY.

Number of Farms Classified by Size.

20 to 49 acres	1
50 to 99 acres	3
100 to 174 acres	4
175 to 259 acres	9
260 to 499 acres	14
500 to 999 acres	3
1,000 acres and over	8
Total	42
Total in 1900	37

Land and Farm Areas.

Approximate land, acres	496,640
Land in farms in 1910	32,001
Land in farms in 1900	15,681
Improved land in farms in 1910	7,579
Improved land in farms in 1900	4,391
Woodland in farms	7,597
Other unimproved land	16,828

Value of all Farm Property.

Total value in 1910	$811,442
Total value in 1900	324,441
Per cent increase, 1900-1910	150.1
Land in 1910	530,968
Land in 1900	198,100
Buildings in 1910	88,475
Buildings in 1900	45,400
Implements and machinery in 1910	30,405
Implements and machinery in 1900	10,810
Domestic animals, poultry and bees in 1910	161,594
Domestic animals, poultry and bees in 1900	70,131

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	759
Other cows	661
Yearling heifers	485
Calves	426
Yearling steers and bulls	400
Other steers and bulls	23
Total	2,754
Value	$58,619
Horses—	
Mature horses	376
Yearling colts	38
Spring colts	12
Total	426
Value	$36,325
Mules—	
Mature mules	18
Total	18
Value	$1,420
Asses and burros—	
Number	14
Value	$200
Swine—	
Mature hogs	309
Spring pigs	208
Total	517
Value	$2,515
Sheep—	
Rams, ewes and wethers	9,832
Spring lambs	6,808
Total	16,640
Value	$61,200
Goats—	
Number	10
Value	$44
Total value all domestic animals	$160,323

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*Records incomplete.

ALPINE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Poultry and bees—	
Poultry of all kinds	2,159
Value	$1,139
Colonies of bees	49
Value	$132

Principal Crops.

	Acres	Bushels
Oats	135	7,274
Wheat	618	19,464
Barley	38	1,480
Dry edible beans	-----	3
Potatoes	22	2,944

Hay and forage—	Acres	Tons
Timothy alone	206	315
Timothy and clover mixed	351	567
Clover alone	10	20
Alfalfa	1,081	2,573
Other tame or cultivated grasses	697	699
Wild, salt, or prairie grasses	1,116	1,309
Grains cut green	355	312
All other hay and forage	30	20
Total	3,846	5,815

Poultry products—	
Poultry raised, number	2,547
Eggs produced, dozen	8,904
Value poultry and eggs produced	$3,618
Honey and wax—	
Honey produced, pounds	220
Value of honey and wax produced	$23
Wool—	
Wool, fleeces shorn	6,790
Value wool and mohair produced	$9,561
Special crops—	
Potatoes, acres	22
All other vegetables, acres	14

Orchard fruits—	Number bearing trees
Apples	1,140
Apricots	7
Cherries	63
Peaches and nectarines	28
Pears	79
Prunes and plums	214
Total	1,531
Tropical fruits—	
Olives	4
Grapevines—	
Number in bearing	9,000

Nuts—	Number bearing trees
Almonds	12
Total	12

Irrigation.

Number of farms irrigated in 1909	32
Acres irrigated in 1909	3,349
Acreage enterprises were capable of irrigating in 1910	3,399
Acreage included in projects	3,435
Main ditches, number	25
Length, miles	34
Laterals, number	3
Length, miles	1
Cost of irrigation enterprises up to July 1, 1910	$7,493
Average cost per acre irrigation enterprises were capable of irrigating in 1910	2.20

Mineral Production in 1914.

Number of mineral springs	1

Alpine has usually shown a small production of gold and silver, but dropped out of the list of producing counties for 1914.

AMADOR COUNTY.

Date of creation, May 11, 1854.

Land area, 601 square miles.
County seat, Jackson City.
Population per square mile, 15.1.

	1890	1900	1910
Population	10,320	11,116	9,086
Population	-----	-----	2,035

Ione (Station)		Highest	Lowest		Inches		Inches
Elevation, 287 feet.	1915: Temperature	105	24	Rainfall	20.32	Snow	0

Amador adjoins El Dorado County on the south, Alpine on the west, Calaveras on the north and Sacramento and San Joaquin counties on the east. It is inland and occupies the east central portion of the State. It has no navigable rivers. The Cosumnes forms a part of its northern boundary and the Mokelumne forms its entire southern boundary. Both of the rivers are tributaries of the Sacramento. Varying, in main, in altitude from 30 feet to 1,500 feet, and having a most productive soil, and the great portion of the county being a rolling, or foothill region, it is adapted to the cultivation of any kind of farm, of horticultural, or of viticultural product.

Grain and hay are cultivated to a considerable extent. In many parts of the western portion of the county a great variety of vegetables is grown throughout the year. Yielding, as the county does, an abundance of the best natural grasses, it offers inducements to stockmen.

Distinctively, the county is a region of mineral deposits. The one resource, however, that is paramount, is gold from the quartz mine.

Mountain lakes and valleys and river canyons furnish aboundant opportunity for those needing recreation, or for those that enjoy hunting and fishing. Mineral springs, having medicinal properties that are prescribed in certain cases, are found in different parts of the county.

AMADOR COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	13
10 to 19 acres	19
20 to 49 acres	41
50 to 99 acres	52
100 to 174 acres	145
175 to 259 acres	64
260 to 499 acres	105
500 to 999 acres	58
1,000 acres and over	38
Total	537
Total in 1900	560

Land and Farm Areas.

Approximate land, acres	384,640
Land in farms in 1910	291,730
Land in farms in 1900	214,024
Improved land in farms in 1910	45,969
Improved land in farms in 1900	48,936
Woodland in farms	114,960
Other unimproved land	129,801

Value of all Farm Property.

Total value in 1910	$4,820,809
Total value in 1900	3,318,850
Per cent increase 1900-1910	45.3
Land in 1910	3,252,895
Land in 1900	2,185,150
Buildings in 1910	589,925
Buildings in 1900	495,630
Implements and machinery in 1910	141,379
Implements and machinery in 1900	127,180
Domestic animals, poultry and bees in 1910	836,610
Domestic animals, poultry and bees in 1900	510,890

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,747
Other cows	7,985
Yearling heifers	2,175
Calves	3,444
Yearling steers and bulls	1,970
Other steers and bulls	3,945
Total	22,266
Value	$506,380
Horses—	
Mature horses	2,291
Yearling colts	218
Spring colts	176
Total	2,685
Value	$233,128

AMADOR COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	212
Yearling colts	10
Spring colts	17
Total	239
Value	$27,590
Asses and burros—	
Number	23
Value	$458
Swine—	
Mature hogs	3,623
Spring pigs	1,673
Total	5,296
Value	$32,647
Sheep—	
Rams, ewes, and wethers	3,919
Spring lambs	2,726
Total	6,645
Value	$20,023
Goats—	
Number	1,597
Value	$3,673
Total value all domestic animals	$823,899
Poultry and bees—	
Poultry of all kinds	23,630
Value	$12,380
Colonies of bees	170
Value	$331

Principal Crops.

	Acres	Bushels
Corn	301	12,526
Oats	1,354	30,813
Wheat	293	5,169
Barley	1,513	29,071
Dry edible beans	3	31
Potatoes	125	14,054
Hay and forage—	Acres	Tons
Timothy alone	6	6
Timothy and clover mixed	29	29
Clover alone	33	33
Alfalfa	1,724	4,778
Other tame and cultivated grasses	968	993
Wild, salt, or prairie grasses	3,599	3,471
Grains cut green	8,090	8,651
Totals	14,449	17,961

Poultry products—	
Poultry raised, number	23,628
Eggs produced, dozen	142,824
Value poultry and eggs produced	$49,621
Honey and wax—	
Honey produced, pounds	2,402
Wax produced, pounds	100
Value of honey and wax produced	$326
Wool—	
Wool, fleeces shorn	7,253
Mohair and goat hair, fleeces shorn	449
Value wool and mohair produced	$5,882

Special crops—	
Potatoes, acres	125
Sweet potatoes, acres	1
All other vegetables, acres	200
Sugar beets, acres	315
Orchard fruits—	Number bearing trees
Apples	8,592
Apricots	1,197
Cherries	1,143
Peaches and nectarines	16,349
Pears	5,112
Prunes and plums	10,685
Total	43,332
Tropical fruits—	Number bearing trees
Figs	347
Lemons	8
Oranges	151
Olives	274
Total	780
Grapevines—	
Number in bearing	314,604
Small fruits—	
Strawberries, acres	6
Blackberries and dewberries, acres	13
All others	10
Total	29
Nuts—	Number bearing trees
Almonds	628
Pecans	1
Walnuts	185
Total	830

Irrigation.

Number of farms irrigated in 1909	73
Acres irrigated in 1909	826
Acreage enterprises were capable of irrigating in 1910	3,973
Acreage included in projects	4,139
Main ditches, number	55
Length, miles	185
Laterals, number	12
Length, miles	56
Cost of irrigation enterprises up to July 1, 1910	$265,608
Average cost per acre irrigation enterprises were capable of irrigating in 1910	66.85

Mineral Production in 1914.

	Amount	Value
Brick, thousand	2,500	$50,000
Clay, tons	32,223	33,114
Coal, tons	5,700	10,062
Copper, pounds	5,251	694
Gold	-----	3,100,000
Lead, pounds	44	2
Lime, barrels	1,540	2,008
Quartz, tons	1,250	2,400
Sand (glass), tons	16,688	9,855
Sandstone, cu. ft.	3,960	1,500
Silver	-----	18,000
Soapstone, tons	610	2,440
Total		$3,230,075

BUTTE COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 1,722 square miles.	Population	17,939	17,117	27,301
County seat, Oroville.	Population	-----	-----	3,859
Population per square mile, 15.9.				

	Highest	Lowest		Inches		Inches
Elevation, 250 feet. 1915: Temperature	110	21	Rainfall	39.36	Snow	3.0

Butte County is situated in the northern and eastern Sacramento Valley, and embodies within its confines both mountain, foothill, and valley land. Its climate is most diverse, and in its confines are grown all the products to be found in the temperate and semi-tropical zones. In the higher altitudes, apples thrive, while in the lowest stretches of the rolling foothills, oranges and olives reach perfection. On the broad plains great rice fields are now being planted, and the industry promises to rival that of alfalfa and dairy farming and the more extensive grain farming that has hitherto prevailed. Deciduous fruits of every kind are grown. Large olive pickling works are located in Oroville. The olive crop in the northern part of the State for 1914 was estimated to amount to about 10,000 tons. There are also a number of orange packing houses in the county.

The county is exceptionally well watered. Through it runs the Feather River, with a large number of tributary streams. On one boundary is the great Sacramento River. As a result of the abundance of water, increased attention is being given to irrigation. The Butte County canal covers thousands of acres around Gridley, where the utmost prosperity prevails.

Butte County is also the third largest gold-producing county of the State. The chief gold-dredging field lies around Oroville.

The county was the first to grow rice on a commercial scale, at Biggs and Gridley.

BUTTE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	116
10 to 19 acres	186
20 to 49 acres	321
50 to 99 acres	143
100 to 174 acres	220
175 to 259 acres	127
260 to 499 acres	171
500 to 999 acres	116
1,000 acres and over	98
Total	1,500
Total in 1900	1,179

Land and Farm Areas.

Approximate land, acres	1,102,080
Land in farms in 1910	490,777
Land in farms in 1900	677,080
Improved land in farms in 1910	247,097
Improved land in farms in 1900	302,029
Woodland in farms	119,126
Other unimproved land	124,554

Value of all Farm Property.

Total value in 1910	$24,086,440
Total value in 1900	15,535,404
Per cent increase 1900-1910	55.0
Land in 1910	19,404,863
Land in 1900	12,460,530
Buildings in 1910	2,281,132
Buildings in 1900	1,434,870
Implements and machinery in 1910	532,320
Implements and machinery in 1900	439,390
Domestic animals, poultry, and bees in 1910	1,868,125
Domestic animals, poultry, and bees in 1900	1,200,614

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	4,713
Other cows	8,359
Yearling heifers	2,605
Calves	3,772
Yearling steers and bulls	2,109
Other steers and bulls	4,660
Total	26,584
Value	$673,968

BUTTE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	6,608
Yearling colts	645
Spring colts	402
Total	7,655
Value	$685,441
Mules—	
Mature mules	1,719
Yearling colts	151
Spring colts	91
Total	1,961
Value	$225,465
Asses and burros—	
Number	18
Value	$2,655
Swine—	
Mature hogs	9,317
Spring pigs	5,016
Total	14,333
Value	$83,927
Sheep—	
Rams, ewes, and wethers	29,137
Spring lambs	15,940
Total	45,077
Value	$138,092
Goats—	
Number	3,215
Value	$8,356
Total value all domestic animals	$1,817,904
Poultry and bees—	
Poultry of all kinds	74,982
Value	$45,750
Colonies of bees	1,384
Value	$4,471

Principal Crops.

	Acres	Bushels
Corn	359	14,856
Oats	1,432	54,685
Wheat	20,894	245,743
Barley	17,705	326,447
Kafir corn and milo maize	409	9,529
Dry edible beans	27	150
Potatoes	171	17,201

Hay and forage—	Acres	Tons
Timothy alone	226	162
Timothy and clover mixed	157	271
Clover alone	81	95
Alfalfa	9,351	38,196
Other tame and cultivated grasses	1,994	2,369
Wild, salt, or prairie grasses	1,253	1,177
Grains cut green	42,726	49,243
All other hay and forage	174	319
Totals	55,962	91,832

Poultry products—	
Poultry raised, number	94,183
Eggs produced, dozen	377,598
Value poultry and eggs produced	$158,052
Honey and wax—	
Honey produced, pounds	9,702
Wax produced, pounds	170
Value of honey and wax produced	$924
Wool—	
Wool, fleeces shorn	38,261
Mohair and goat hair, fleeces shorn	1,749
Value wool and mohair produced	$33,991
Special crops—	
Potatoes, acres	171
Sweet potatoes, acres	21
All other vegetables, acres	513
Sugar beets, acres	711

Orchard fruits—	Number bearing trees
Apples	34,425
Apricots	9,900
Cherries	4,317
Peaches and nectarines	255,047
Pears	22,159
Prunes and plums	104,474
Total	452,302
Tropical fruits—	
Figs	9,518
Lemons	2,223
Oranges	147,412
Pomeloes	122
Olives	73,453
Total	235,442
Grapevines—	
Number in bearing	258,742
Small fruits—	
Strawberries, acres	48
Blackberries and dewberries, acres	57
All others, acres	43
Total	148

Nuts—	Number bearing trees
Almonds	84,069
Pecans	158
Walnuts	1,063
Total	85,445

Irrigation.

Number of farms irrigated in 1909	556
Acres irrigated in 1909	28,754
Acreage enterprises were capable of irrigating in 1910	115,075
Acreage included in projects	233,500
Main ditches, number	135
Length, miles	270
Laterals, number	145
Length, miles	170
Pumped wells, number	46
Cost of irrigation enterprises up to July 1, 1910	$1,231,894
Average cost per acre irrigation enterprises were capable of irrigating in 1910	10.71

Mineral Production in 1914.

	Amount	Value
Gems	-----	$100
Gold	-----	1,700,000
Lead, pounds	513	20
Mineral water, gallons	1,200	300
Miscellaneous stone	-----	50,895
Silver	-----	4,000
Total		$1,755,315
Number of mineral springs		3

CALAVERAS COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 1,027 square miles.	Population	8,882	11,200	9,171
County seat, San Andreas.	Population	1,640	1,683	1,120
Population per square mile, 8.9.				

Mokelumne Hill (Station)		Highest	Lowest		Inches		Inches
Elevation, 1,550 feet. 1915:	Temperature	103	25	Rainfall	35.40	Snow	2.0

Calaveras is located on the long, gradual western slope of the Sierra Nevada, a little above the center of the State north and south. The Sierra on the east is an abrupt wall plunging down 10,000 feet in ten miles, while the westward side is a long, grand sweep, full seventy miles from foothill to summit. On the east is the great desert basin of Nevada and Utah; on the west the exuberance of California valleys, rich in meadows, grainfields, and orchards. Above the level plain rise the foothills in waves or ripples, hardly distinguishable from the plains at first, but more rolling as you go upward, with long swells of hill and little dales and scattering growth of oak and pine and patches of chaparral.

The elevation rises gradually from about 150 feet to table-lands lying 4,000 feet and peaks of 7,500 feet.

In several parts of the county Angora goats are kept. They are profitable, are hardy, and increase rapidly. The young make excellent "mutton."

Alfalfa is a staple crop wherever it can be irrigated.

CALAVERAS COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	25
10 to 19 acres	14
20 to 49 acres	48
50 to 99 acres	45
100 to 174 acres	171
175 to 259 acres	60
260 to 499 acres	127
500 to 999 acres	80
1,000 acres and over	62
Total	632
Total in 1900	575

Land and Farm Areas.

Approximate land, acres	657,280
Land in farms in 1910	271,401
Land in farms in 1900	212,820
Improved land in farms in 1910	59,104
Improved land in farms in 1900	41,402
Woodland in farms	149,642
Other unimproved land	62,655

Value of all Farm Property.

Total in 1910	$3,973,409
Total in 1900	2,335,659
Per cent increase 1900-1910	70.1
Land in 1910	2,376,303
Land in 1900	1,393,510
Buildings in 1910	664,000
Buildings in 1900	427,190
Implements and machinery in 1910	138,905
Implements and machinery in 1900	89,030
Domestic animals, poultry, and bees in 1910	791,201
Domestic animals, poultry, and bees in 1900	425,929

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	1,824
Other cows	8,407
Yearling heifers	2,432
Calves	3,355
Yearling steers and bulls	2,057
Other steers and bulls	2,902
Total	20,977
Value	$422,395
Horses—	
Mature horses	3,143
Yearling colts	302
Spring colts	203
Total	3,648
Value	$264,717
Mules—	
Mature mules	25
Yearling colts	13
Spring colts	25
Total	63
Value	$3,920
Asses and burros—	
Number	27
Value	$1,850
Swine—	
Mature hogs	2,588
Spring pigs	1,586
Total	4,174
Value	$24,368

CALAVERAS COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes, and wethers	10,145
Spring lambs	5,215
Total	15,360
Value	$54,509
Goats—	
Number	3,318
Value	$7,931
Total value all domestic animals	$779,690
Poultry and bees—	
Poultry of all kinds	23,242
Value	$13,519
Colonies of bees	362
Value	$992

Principal Crops.

	Acres	Bushels
Corn	80	1,776
Oats	108	2,121
Wheat	51	439
Barley	222	4,833
Kafir corn and milo maize	5	48
Dry edible beans	8	238
Potatoes	147	20,997
Hay and forage—	Acres	Tons
Timothy alone	79	72
Timothy and clover mixed	118	290
Clover alone	102	206
Alfalfa	649	2,313
Other tame and cultivated grasses	662	587
Wild, salt, or prairie grasses	4,648	3,431
Grains cut green	9,023	8,787
Totals	15,281	15,686

Poultry products—	
Poultry raised, number	31,410
Eggs produced, dozen	107,387
Value poultry and eggs produced	$49,807
Honey and wax—	
Honey produced, pounds	8,413
Wax produced, pounds	118
Value of honey and wax produced	$632
Wool—	
Wool, fleeces shorn	15,677
Mohair and goat hair, fleeces shorn	517
Value wool and mohair produced	$11,551
Special crops—	
Potatoes, acres	147
All other vegetables, acres	278
Sugar beets, acres	1

	Number bearing trees
Orchard fruits—	
Apples	13,341
Apricots	672
Cherries	459
Peaches and nectarines	5,954
Pears	2,178
Prunes and plums	8,265
Total	31,276

	Number bearing trees
Tropical fruits—	
Figs	1,839
Lemons	19
Oranges	388
Pomeloes	3
Olives	4,065
Total	6,315

Grapevines—	
Number in bearing	212,300
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	14
All others, acres	15
Total	34

	Number bearing trees
Nuts—	
Almonds	14,624
Pecans	6
Walnuts	832
Total	15,619

Irrigation.

Number of farms irrigated in 1909	154
Acres irrigated in 1909	1,275
Acreage enterprises were capable of irrigating in 1910	3,161
Acreage included in projects	3,919
Main ditches, number	148
Length, miles	124
Laterals, number	32
Length, miles	31
Flowing wells, number	6
Pumped wells, number	7
Cost of irrigation enterprises up to July 1, 1910	$121,033
Average cost per acre irrigation enterprises were capable of irrigating in 1910	32.29

Mineral Production in 1914.

	Amount	Value
Chromite, tons	650	$4,550
Clay, tons	280	280
Copper, pounds	4,468,998	594,377
Fuller's earth, tons	290	2,618
Gold	------	1,400,000
Lead, pounds	30	1
Mineral water, gallons	15,508	6,517
Silver	------	60,000
Total		$2,068,343

COLUSA COUNTY.

Date of creation, February 18, 1850.

Land area, 1,140 square miles.
County seat, Colusa (town.)
Population per square mile, 6.8.

	1890	1900	1910
Population	14,640	7,364	7,732
Population	1,336	1,441	1,582

Elevation, 60 feet. 1915:	Highest	Lowest		Inches		Inches
Temperature	105	23	Rainfall	19.59	Snow	0

Colusa County is situated in the heart of the great Sacramento Valley. The fertile soil, the temperate climate, the extreme dryness of the atmosphere during two-thirds of the year, and, lastly, a sufficient rainfall, make possible the production of great wealth from the fertile acres of this county.

The western portion of the county is principally mountainous, with some very productive valleys intervening. Cattle and live stock interests prevail. Several mineral springs are located in this portion of the county, and thousands of bottles of mineral water are shipped annually. At Sites two quarries take out stone, known as the famous Colusa sandstone, from which many prominent buildings in San Francisco are built.

Colusa County was one of the first to grow rice, and now has a considerable acreage in that grain.†

COLUSA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	31
10 to 19 acres	35
20 to 49 acres	85
50 to 99 acres	42
100 to 174 acres	90
175 to 259 acres	30
260 to 499 acres	129
500 to 999 acres	104
1,000 acres and over	120
Total	667
Total in 1900	582

Land and Farm Areas.

Approximate land, acres	729,600
Land in farms in 1910	522,376
Land in farms in 1900	550,002
Improved land in farms in 1910	336,509
Improved land in farms in 1900	358,227
Woodland in farms	38,252
Other unimproved land	147,615

Value of all Farm Property.

Total in 1910	$19,602,208
Total in 1900	13,054,483
Per cent increase 1900-1910	50.2
Land in 1910	16,066,035
Land in 1900	10,885,350
Buildings in 1910	1,204,780
Buildings in 1900	838,420
Implements and machinery in 1910	419,557
Implements and machinery in 1900	417,690
Domestic animals, poultry, and bees in 1910	1,911,836
Domestic animals, poultry, and bees in 1900	913,023

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,128
Other cows	6,571
Yearling heifers	2,140
Calves	2,606
Yearling steers and bulls	1,556
Other steers and bulls	2,619
Total	*18,750
Value	*$420,618
Horses—	
Mature horses	3,992
Yearling colts	481
Spring colts	259
Total	4,732
Value	$428,700
Mules—	
Mature mules	4,607
Yearling colts	437
Spring colts	247
Total	5,291
Value	$629,345
Asses and burros—	
Number	65
Value	$15,275
Swine—	
Mature hogs	17,646
Spring pigs	10,418
Total	28,064
Value	$161,174

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†For details regarding rice, see page 88.

*Includes animals, age and sex not specified.

COLUSA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes, and wethers	39,801
Spring lambs	24,791
Total	64,592
Value	$202,703
Goats—	
Number	2,154
Value	$7,271
Total value all domestic animals	$1,874,086
Poultry and bees—	
Poultry of all kinds	61,113
Value	$33,372
Colonies of bees	1,406
Value	$4,378

Principal Crops.

	Acres	Bushels
Corn	706	16,619
Oats	771	12,556
Wheat	11,168	221,549
Barley	89,985	1,949,223
Kafir corn and milo maize	2,598	48,418
Dry edible beans	1,083	20,087
Potatoes	439	28,391

Hay and forage—	Acres	Tons
Timothy alone	225	305
Timothy and clover mixed	160	191
Clover alone	10	20
Alfalfa	4,242	14,472
Other tame and cultivated grasses	70	85
Wild, salt, or prairie grasses	568	552
Grains cut green	24,221	29,047
All other hay and forage	85	1,107
Total	29,581	45,779

Poultry products—	
Poultry raised, number	73,034
Eggs produced, dozen	249,229
Value poultry and eggs produced	$92,466
Honey and wax—	
Honey produced, pounds	67,689
Wax produced, pounds	798
Value of honey and wax produced	$5,790
Wool—	
Wool, fleeces shorn	73,221
Mohair and goat hair, fleeces shorn	4,009
Value wool and mohair produced	$56,620
Special crops—	
Potatoes, acres	439
Sweet potatoes, acres	6
All other vegetables, acres	160
Sugar beets, acres	211

Orchard fruits—	Number bearing trees
Apples	3,067
Apricots	4,420
Cherries	223
Peaches and nectarines	4,075
Pears	2,432
Prunes and plums	57,468
Total	71,796

Tropical fruits—	Number bearing trees
Figs	1,391
Lemons	199
Oranges	1,537
Pomeloes	70
Olives	336
Total	3,537

Grapevines—	
Number in bearing	482,417
Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	5
All others, acres	1
Total	7

Nuts—	Number bearing trees
Almonds	16,078
Pecans	10
Walnuts	1,306
Total	17,409

Irrigation.

Number of farms irrigated in 1909	112
Acres irrigated in 1909	4,276
Acreage enterprises were capable of irrigating in 1910	16,541
Acreage included in projects	18,783
Main ditches, number	38
Length, miles	44
Laterals, number	10
Length, miles	7
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$76,112
Average cost per acre irrigation enterprises were capable of irrigating in 1910	4.60

Mineral Production in 1914.

	Amount	Value
Mineral water, gallons	92,000	$24,951
Sandstone, cubic feet	16,000	7,300
Total		$32,251
Number of mineral springs		12

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*Includes animals, age and sex not specified.

CONTRA COSTA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 714 square miles.	Population	13,515	18,046	31,674
County seat, Martinez (town).	Population	1,600	1,380	2,115
Population per square mile, 44.4.				

Antioch (Station)		Highest	Lowest		Inches		Inches
Elevation, 46 feet.	1915: Temperature	106	29	Rainfall	15.34	Snow	0

Contra Costa is one of the central counties, its shore line being within fourteen miles of San Francisco. It possesses unusually good traveling facilities both by rail and by steamer. The county has seventy miles of water front, nearly all of which is upon deep water, navigable by all vessels engaged in commerce. Over three-fourths of its area is cultivated, the balance being used for grazing. The only mountain of any size is Mount Diablo, which is 3,896 feet in height, and almost in the geographical center of the county.

The farming lands in the eastern section are between the foothills and the San Joaquin River. The soil is of a rich, alluvial nature, and produces wheat, barley, alfalfa, fruit, and vines. To the northward and between the uplands and the San Joaquin River is a body of the tule lands, a large portion of which has been reclaimed, and is some of the most productive land in the State, being a rich deposit of sediment and decomposed vegetation. Alfalfa, asparagus, potatoes, beans, etc., are produced on the largest scale on such lands.

Grain raising is very important in this county. A large acreage is planted to barley and hay. The raising of sugar beets is a growing industry. Vegetables of all kinds are raised profitably.

Stock raising is a leading industry, and the reclaimed lowlands for summer grazing and the rolling hills for winter, close together, create conditions whereby a failure is impossible. The stock farms have produced some of the most famous trotting and pacing horses. Port Costa, the shipping point for the bulk of the grain raised in California, has extensive warehouses. Near Vallejo Junction is the largest smelting works in the State; at Vallona are extensive lumber yards, where ships from Oregon and Puget Sound discharge; at Crockett are flouring mills, also the refinery of the California and Hawaiian Sugar Company. At Richmond one of the largest oil refining plants in the State is situated.

CONTRA COSTA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	18
3 to 9 acres	118
10 to 19 acres	127
20 to 49 acres	221
50 to 99 acres	158
100 to 174 acres	256
175 to 259 acres	147
260 to 499 acres	206
500 to 999 acres	140
1,000 acres and over	74
Total	1,465
Total in 1900	1,511

Land and Farm Areas.

Approximate land, acres	456,960
Land in farms in 1910	406,433
Land in farms in 1900	406,563
Improved land in farms in 1910	262,152
Improved land in farms in 1900	262,617
Woodland in farms	28,766
Other unimproved land	115,515

CONTRA COSTA COUNTY SUMMARY—Continued.

Value of all Farm Property.

Total in 1910	$31,812,192
Total in 1900	18,874,387
Per cent increase 1900-1910	68.5
Land in 1910	26,586,160
Land in 1900	15,553,110
Buildings in 1910	2,493,375
Buildings in 1900	1,675,790
Implements and machinery in 1910	680,520
Implements and machinery in 1900	404,590
Domestic animals, poultry and bees, in 1910	2,052,137
Domestic animals, poultry and bees, in 1900	1,240,897

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	9,469
Other cows	6,567
Yearling heifers	3,240
Calves	4,479
Yearling steers and bulls	1,123
Other steers and bulls	1,651
Total	26,529
Value	$647,877
Horses—	
Mature horses	9,494
Yearling colts	1,095
Spring colts	644
Total	11,233
Value	$1,136,119
Mules—	
Mature mules	564
Yearling colts	63
Spring colts	24
Total	651
Value	$78,810
Asses and burros—	
Number	6
Value	$4,265
Swine—	
Mature hogs	3,887
Spring pigs	3,054
Total	6,941
Value	$44,330
Sheep—	
Rams, ewes, and wethers	14,132
Spring lambs	5,463
Total	19,595
Value	$73,877
Goats—	
Number	17
Value	$76
Total value all domestic animals	$1,985,354

Poultry and bees—	
Poultry of all kinds	118,944
Value	$64,673
Colonies of bees	698
Value	$2,110

Principal Crops.

	Acres	Bushels
Corn	263	6,158
Oats	1,112	40,178
Wheat	2,443	53,332
Barley	18,665	731,970
Dry edible beans	2,156	61,498
Potatoes	12,687	2,226,695

Hay and forage—	Acres	Tons
Clover alone	839	1,874
Alfalfa	3,477	8,163
Other tame and cultivated grasses	3,825	4,901
Wild, salt, or prairie grasses	1,050	1,215
Grains cut green	79,368	112,478
All other hay and forage	378	449
Totals	88,937	129,080

Poultry products—	
Poultry raised, number	154,332
Eggs produced, dozen	664,951
Value poultry and eggs produced	247,618
Honey and wax—	
Honey produced, pounds	15,950
Wax produced, pounds	284
Value of honey and wax produced	1,382
Wool—	
Wool, fleeces shorn	14,715
Value wool and mohair produced	10,869
Special crops—	
Potatoes, acres	12,687
All other vegetables, acres	3,650
Sugar beets, acres	40

Orchard fruits—	Number bearing trees
Apples	13,429
Apricots	38,812
Cherries	7,258
Peaches and nectarines	39,461
Pears	68,088
Prunes and plums	58,177
Total	225,939

Tropical fruits—	Number bearing trees
Figs	293
Lemons	148
Oranges	402
Olives	9,744
Total	10,597
Grapevines—	
Number in bearing	2,972,130

CONTRA COSTA COUNTY SUMMARY—Continued.

Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	3
All others	2
Total	6

Nuts—	Number bearing trees
Almonds	209,056
Pecans	25
Walnuts	110,088
Total	215,249

Irrigation.

Number of farms irrigated in 1909	78
Acres irrigated in 1909	26,856
Acreage enterprises were capable of irrigating in 1910	32,562
Acreage included in projects	32,640
Main ditches, number	176
Length, miles	172
Flowing wells, number	1
Pumped wells, number	26
Cost of irrigation enterprises up to July 1, 1910	$90,503
Average cost per acre irrigation enterprises were capable of irrigating in 1910	2.78

Mineral Production in 1914.

	Amount	Value
Brick, thousand	16,064	$129,543
Coal, tons	67	268
Lime, tons	5,666	4,724
Limestone, tons	32,657	43,661
Mineral water, gallons	364,288	3,643
Miscellaneous stone	-----	308,727
Other minerals	-----	658,755
Total		$1,149,321
Number of mineral springs		8

DEL NORTE COUNTY.

Date of creation, March 2, 1857.

Land area, 1,024 square miles.
County seat, Crescent City.
Population per square mile, 2.4.

	1890	1900	1910
Population	2,592	2,408	2,417
Population	907	699	1,114

Elevation, 125 feet. 1915:	Highest	Lowest		Inches		Inches
Temperature	89	26	Rainfall	83.55	Snow	0

Del Norte is the extreme northwestern county of California and has a coast line of about 35 miles. Crescent City, the county seat and principal harbor, is 280 miles from San Francisco.

Smith and Klamath are the principal streams, the former in the northern and the latter in the southern part of the county. Both are navigable near their mouths to the small ocean-going steamers. Dairying and lumbering are the principal industries. The mountains of the county prospect well in copper and gold-bearing formations.

Crescent City is the chief shipping point. Products usually are sent to the San Francisco market. The county is rich in undeveloped mineral resources.

With transportation facilities, Del Norte is destined to become one of the apple-producing regions of California.

DEL NORTE COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	2
10 to 19 acres	6
20 to 49 acres	9
50 to 99 acres	13
100 to 174 acres	31
175 to 259 acres	11
260 to 499 acres	23
500 to 999 acres	10
1,000 acres and over	9
Total	114
Total in 1900	131

Land and Farm Areas.

Approximate land, acres	655,360
Land in farms in 1910	35,947
Land in farms in 1900	33,115
Improved land in farms in 1910	12,439
Improved land in farms in 1900	9,787
Woodland in farms	10,574
Other unimproved land	12,934

Value of all Farm Property.

Total in 1910	$1,770,222
Total in 1900	1,021,040
Per cent increase 1900-1910	73.4
Land in 1910	1,358,300
Land in 1900	687,830
Buildings in 1910	171,380
Buildings in 1900	121,840
Implements and machinery in 1910	48,265
Implements and machinery in 1900	35,130
Domestic animals, poultry, and bees in 1910	192,277
Domestic animals, poultry, and bees in 1900	176,240

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,575
Other cows	620
Yearling heifers	849
Calves	1,306
Yearling steers and bulls	273
Other steers and bulls	234
Total	6,857
Value	$137,380
Horses—	
Mature horses	382
Yearling colts	45
Spring colts	14
Total	441
Value	$37,265
Mules—	
Mature mules	3
Value	$475
Swine—	
Mature hogs	1,153
Spring pigs	617
Total	1,770
Value	$8,451
Sheep—	
Rams, ewes, and wethers	1,341
Spring lambs	500
Total	1,841
Value	$5,063

DEL NORTE COUNTY SUMMARY—Continued.

Goats—	
Number	465
Value	$1,245
Total value all domestic animals	$189,879
Poultry and bees—	
Poultry of all kinds	3,911
Value	$2,175
Colonies of bees	78
Value	$223

Principal Crops.

	Acres	Bushels
Corn	1	12
Oats	216	12,078
Barley	32	840
Dry edible beans	-----	10
Potatoes	69	9,800

Hay and forage—	Acres	Tons
Timothy alone	6	11
Timothy and clover mixed	49	148
Clover alone	63	169
Alfalfa	33	90
Other tame and cultivated grasses	1,093	1,853
Wild, salt, or prairie grasses	50	50
Grains cut green	1,509	3,597
All other hay and forage	249	4,213
Totals	3,052	10,131

Poultry products—	
Poultry raised, number	3,357
Eggs produced, dozen	13,767
Value poultry and eggs produced	$4,651

Honey and wax—	
Honey produced, pounds	1,395
Value	$152
Wool—	
Wool, fleeces shorn	1,238
Mohair and goat hair, fleeces shorn	40
Value wool and mohair produced	$2,070
Special crops—	
Potatoes, acres	69
All other vegetables, acres	29

Orchard fruits—	Number bearing trees
Apples	3,234
Cherries	48
Peaches and nectarines	42
Pears	129
Prunes and plums	96
Total	3,549
Tropical fruits—	
Figs	1
Small fruits—	
Strawberries, acres	1

Nuts—	Number bearing trees
Pecans	3
Walnuts	3
Total	6

Mineral Production in 1914.

	Value
Gold	$2,000
Miscellaneous stone	3,250
Silver	20
Total	$5,270

EL DORADO COUNTY.

Date of creation, February 18, 1850.

Land area, 1,753 square miles.
County seat, Placerville.
Population per square mile, 4.3.

	1890	1900	1910
Population-----	9,232	8,986	7,492
Population-----	1,690	1,748	1,914

Elevation, 1,875 feet.

1915:	Highest	Lowest		Inches		Inches
Temperature---	100	24	Rainfall---	41.07	Snow---	2.0

El Dorado County is situated on the western slope of the Sierra Nevada Mountains, in the eastern portion of the State. The county is about 75 miles long and about 30 miles in width. The western portion of the county borders the Sacramento Valley, and is used principally for grazing, stock raising, and wine vineyards. The central portion of the county includes the great mineral belt, known as the "mother lode," from which millions of dollars have been extracted on and near the surface in its infancy. In this belt, which is chiefly foothills, can be found some of the best fruit lands in the State.

The eastern portion, being at an altitude of from 3,000 to 7,000 feet, supplies summer pasturage for a number of cattle, sheep, and horses. In this region water is abundant, awaiting capital and labor to harness the everflowing streams. Most of this area is covered by a virgin growth of sugar and white pine, fir, and cedar timber.

(*Information supplied by the Chamber of Commerce.*)

While fruit growing has been found to be more profitable here than in most parts of the State, potatoes are now attracting much attention. There will probably be twenty thousand sacks or over raised in the vicinity of Placerville during this season. They are beautiful, smooth skinned, perfectly shaped, and, on account of the high, dry altitude, are extremely mealy.

During the season of 1914, 300 cars of deciduous fruit were shipped, of which 250 went to eastern cities and 50 to local California markets. The average price obtained on Bartlett pears was close to $1.35 per box, f. o. b. Placerville.

During 1915, on account of the low prevailing prices on peaches in the eastern markets, much of these were shipped to San Francisco and Oakland, thus reducing the shipments to eastern points to about 130 cars, comprised mostly of pears and plums. Bartlett pears averaged during 1915 about $1.50 f. o. b. shipping point.

Several hundred acres of young pear trees have been planted in the last five years and in another year or two the output of Bartlett pears will have been doubled and in four years from now that figure will probably be again doubled.

EL DORADO COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	26
10 to 19 acres	21
20 to 49 acres	60
50 to 99 acres	88
100 to 174 acres	212
175 to 259 acres	100
260 to 499 acres	122
500 to 999 acres	52
1,000 acres and over	35
Total	716
Total in 1900	759

Land and Farm Areas.

Approximate land, acres	1,121,920
Land in farms in 1910	210,881
Land in farms in 1900	209,320
Improved land in farms in 1910	41,682
Improved land in farms in 1900	45,481
Woodland in farms	137,057
Other unimproved land	32,142

Value of all Farm Property.

Total in 1910	$3,775,358
Total in 1900	2,590,574
Per cent increase 1900-1910	45.7
Land in 1910	2,343,931
Land in 1900	1,546,240
Buildings in 1910	749,745
Buildings in 1900	566,120
Implements and machinery in 1910	162,185
Implements and machinery in 1900	116,320
Domestic animals, poultry, and bees in 1910	519,497
Domestic animals, poultry, and bees in 1900	361,894

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,823
Other cows	4,338
Yearling heifers	1,683
Calves	2,154
Yearling steers and bulls	1,138
Other steers and bulls	912
Total	13,048
Value	$254,098
Horses—	
Mature horses	2,274
Yearling colts	180
Spring colts	90
Total	2,544
Value	$202,610
Mules—	
Mature mules	93
Yearling colts	9
Spring colts	10
Total	112
Value	$10,130
Asses and burros—	
Number	17
Value	$2,985
Swine—	
Mature hogs	1,428
Spring pigs	973
Total	2,401
Value	$16,502
Sheep—	
Rams, ewes and wethers	1,763
Spring lambs	1,399
Total	3,162
Value	$11,580
Goats—	
Number	3,315
Value	$7,136
Total value all domestic animals	$189,879
Poultry and bees—	
Poultry of all kinds	24,308
Value	$12,667
Colonies of bees	464
Value	$1,079

Principal Crops.

	Acres	Bushels
Corn	38	768
Oats	543	10,504
Wheat	193	3,201
Barley	50	884
Potatoes	113	18,513
Hay and forage—	Acres	Tons
Timothy alone	13	14
Timothy and clover mixed	443	466
Clover alone	234	493
Alfalfa	407	824
Other tame and cultivated grasses	447	508
Wild, salt, or prairie grasses	2,535	2,191
Grains cut green	7,989	7,142
All other hay and forage	47	47
Totals	12,115	11,685

Poultry products—	
Poultry raised, number	28,499
Eggs produced, dozen	132,910
Value poultry and eggs produced	$45,411
Honey and wax—	
Honey produced, pounds	8,105
Wax produced, pounds	75
Value of honey and wax produced	$696
Wool—	
Wool, fleeces shorn	3,808
Mohair and goat hair, fleeces shorn	933
Value wool and mohair produced	$3,504
Special crops—	
Potatoes, acres	113
All other vegetables, acres	197

EL DORADO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	31,929
Apricots	3,051
Cherries	3,259
Peaches and nectarines	61,800
Pears	49,672
Prunes and plums	32,764
Total	180,017

Tropical fruits—	Number bearing trees
Figs	587
Oranges	53
Olives	37
Total	677

Grapevines—	
Number in bearing	581,342

Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	11
All others, acres	7
Total, acres	23

Nuts—	Number bearing trees
Almonds	438
Walnuts	880
Total	1,318

Irrigation.

Number of farms irrigated in 1909	244
Acres irrigated in 1909	5,122
Acreage enterprises were capable of irrigating in 1910	5,501
Acreage included in projects	20,264
Main ditches, number	56
Length, miles	285
Laterals, number	25
Length, miles	55
Cost of irrigation enterprises up to July 1, 1910	$346,939
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$63.07

Mineral Production in 1914.

	Amount	Value
Gold	-----	$135,000
Lead, pounds	90	4
Lime, barrels	14,000	12,082
Miscellaneous stone	-----	2,600
Silver	-----	400
Total		$150,086
Number of mineral springs		5

FRESNO COUNTY.

Date of creation, April 19, 1856.

Land area, 5,950 square miles.
County seat, Fresno (city).
Population per square mile, 12.7.

	1890	1900	1910
Population	32,025	37,862	75,657
Population	10,818	12,470	24,892

	Highest	Lowest		Inches		Inches
Elevation, 293 feet. 1915: Temperature	109	24	Rainfall	11.65	Snow	0

Including vineyards, Fresno County is the greatest fruit and wine producer. It is situated in the center of the State and in the middle of the fertile San Joaquin Valley. There are only five counties which exceed Fresno in size—San Bernardino, Inyo, Kern, Riverside, and Siskiyou, in the order named. When Fresno was first formed it was considerably larger, but on the eleventh of March, 1893, a large slice, consisting of 2,121 square miles, was carved out of the northern part of the county and formed into Madera County; and still more recently, Fresno County was again mutilated by 202 square miles of the southeast portion being transferred to Kings County by an act of the legislature approved April 12, 1909. Before being partitioned, Fresno County comprised 8,214 square miles, but although the land area has been thus reduced to 5,950 square miles, the county ranks sixth of the fifty-eight in the State, and is one of the most productive. It is also the fifth largest in population, being only exceeded by San Francisco, Los Angeles, Alameda and Santa Clara. The word ''Fresno,'' in Spanish, signifies ash tree, and it was because of the abundance of mountain ash in the mountains of this county that it received its name.

Fresno County is naturally subdivided into two portions—plains and mountains. The plains are the bottom of the San Joaquin Valley, extending from the foot of the Coast Range on the west to the foothills of the Sierra Nevada on the east. From the first foothills the rise is rapid, the mountains culminating in peaks rising 10,000 to 12,000 feet high. The country about Fresno is a vast plain intersected by the San Joaquin and Kings rivers and their tributaries. Four natural soil divisions have been recognized—the foothill region, where agriculture was formerly confined to grazing; the plains of the valley, with red soils lying near the hills; the ''white ash'' soil found farther out in the plain, and the bottoms, or alluvial lands, along the Kings River.

There is a dry and a wet season, the former from about May to September, and the latter from the middle of October or early part of November. The rains, which are at irregular intervals during the winter, seldom last more than two or three days at a time. There are about 238 days of sunshine in the year. The atmosphere during the summer months is dry, and the heat not nearly so oppressive as in the East and other places where the humidity is great. Sunstroke is unknown.

The county has passed through four stages of development. First came mining in the early days before it was organized as a county, and this period extended to about 1860-64. Secondly, came the stock-raising period, which arose from the gradual disappearance of placer mining, and lasted until 1874, although sheep raising still continued on a large scale; thirdly, about 1868, the farming interests sprang up, although prior to the advent of the railroad in 1870, agriculture amounted to very little. The fourth, and most important, may be called the viticultural and fruit era, which began to come into prominence early in the eighties, and has now become the leading feature of the county.

As California holds the first place among all the states in the Union in irrigation, so Fresno is the leading county in the State, both in number and extent of its canals and ditches, having more than double the acreage under irrigation than has any other county.

During the last ten years, the dairy industry has made great progress, except in the manufacture of cheese, which, however, was never produced on a very large scale.

Including grapes, Fresno produces more fruit than any other county in the State. Fresno County holds the first place in the production of grapes, raisins, figs, sweet wines, and brandy, and is one of the leading counties of the State in the production of peaches, apricots, and olives, and the acreage in citrus fruits is rapidly increasing.

Fresno is one of the largest producers of olive oil and pickled olives in the State, both being of a very high grade.

In figs, the county has been a large producer for many years, and is noted for the now well-known Smyrna, or "Calimyrna" figs, which were first introduced into this State by George C. Roeding, of Fresno. The quantity now packed in Fresno amounts to several thousand tons per annum.

The varieties of fish include salmon, black bass, trout, and catfish, all of which are plentiful.

There is an abundance of game, including quail, doves, a large variety of ducks and wild geese, but there is no means at present of ascertaining either the quantity or money value of either fish or game. The sums received for hunting licenses, however, are considerable.

The value of the lumber industry to the county is very large, varying from sixty to seventy-five million feet, board measure, with an average value of some two million dollars a year, comprising sugar pine, white pine, fir, and sequoia.

The great increase in the manufactures of Fresno is due chiefly to the increase in the canning and preserving of fruits and vegetables, the value of products for which amounted to $6,942,440, and formed 70.5 per cent of the total value of all the manufacturing industries of the city. In 1909 the total value of all products amounted to $11,090,000 and in 1914 to $16,520,000, or an increase in five years of 49 per cent. Most of the fruit preserving of Fresno is by the drying or evaporating process, and the greatest crop is in raisins, in which Fresno leads the world.

In recent years the production of petroleum in Fresno County has developed from a small beginning into one of the most important industries. In 1900 the wells in the county at Coalinga produced 532,000 barrels of the value of about $547,960; in 1914 the production was 18,956,965 barrels valued at $7,927,736. The county ranks third in the State in the value of minerals produced, the total in 1914 being $7,484,231.*

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*For details regarding petroleum, see Part VII.

FRESNO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	267
10 to 19 acres	598
20 to 49 acres	3,240
50 to 99 acres	951
100 to 174 acres	609
175 to 259 acres	142
260 to 499 acres	202
500 to 999 acres	119
1,000 acres and over	111
Total	6,245
Total in 1900	3,290

Land and Farm Areas.

Approximate land, acres	3,808,000
Land in farms in 1910	1,106,616
Land in farms in 1900	1,284,736
Improved land in farms in 1910	590,205
Improved land in farms in 1900	786,337
Woodland in farms	93,194
Other unimproved land	423,217

Value of all Farm Property.

Total value in 1910	$92,583,058
Total value in 1900	42,829,479
Per cent increase 1900-1910	*
Land in 1910	75,136,654
Land in 1900	34,201,530
Buildings in 1910	6,861,289
Buildings in 1900	3,092,140
Implements and machinery in 1910	3,228,706
Implements and machinery in 1900	1,593,890
Domestic animals, poultry, and bees in 1910	7,356,409
Domestic animals, poultry, and bees in 1900	3,941,919

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	22,241
Other cows	42,001
Yearling heifers	13,117
Calves	12,682
Yearling steers and bulls	15,354
Other steers and bulls	22,230
Total	127,625
Value	$3,258,420
Horses—	
Mature horses	22,063
Yearling colts	1,899
Spring colts	1,047
Total	25,009
Value	$2,583,216
Mules—	
Mature mules	3,498
Yearling colts	298
Spring colts	183
Total	3,979
Value	$534,660
Asses and burros—	
Number	101
Value	$34,883
Swine—	
Mature hogs	20,134
Spring pigs	13,016
Total	33,150
Value	$230,325
Sheep—	
Rams, ewes, and wethers	94,757
Spring lambs	47,254
Total	142,011
Value	$555,057
Goats—	
Number	4,558
Value	$8,485
Total value all domestic animals	$7,205,046
Poultry and bees—	
Poultry of all kinds	213,108
Value	$116,504
Colonies of bees	9,242
Value	$34,859

Principal Crops.

	Acres	Bushels
Corn	1,422	37,726
Oats	1,554	20,027
Wheat	7,829	97,391
Barley	32,132	694,234
Kafir corn and milo maize	1,689	37,506
Dry edible beans	9	155
Potatoes	218	23,891

Hay and forage—	Acres	Tons
Timothy and clover mixed	3	6
Clover alone	10	62
Alfalfa	47,776	167,217
Other tame and cultivated grasses	243	208
Wild, salt, or prairie grasses	2,741	2,343
Grains cut green	44,159	43,863
All other hay and forage	333	960
Totals	95,265	214,659

Poultry products—	
Poultry raised, number	266,221
Eggs produced, dozen	1,267,830
Value of poultry and eggs produced	$419,265
Honey and wax—	
Honey produced, pounds	616,609
Wax produced, pounds	7,261
Value of honey and wax produced	$33,356
Wool—	
Wool, fleeces shorn	107,802
Mohair and goat hair, fleeces shorn	1,900
Value of wool and mohair produced	$109,982

FRESNO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Special crops—	
Potatoes, acres	218
Sweet potatoes, acres	57
All other vegetables, acres	1,391
Sugar beets, acres	228

Orchard fruits—	Number bearing trees
Apples	32,097
Apricots	186,823
Cherries	2,729
Peaches and nectarines	2,277,314
Pears	13,356
Prunes and plums	66,926
Total	2,579,859

Tropical fruits—	Number bearing trees
Figs	120,124
Lemons	12,389
Oranges	85,781
Pomeloes	346
Olives	72,788
Total	291,754

Grapevines—	
Number in bearing	40,687,207

Small fruits—	
Strawberries, acres	148
Blackberries and dewberries, acres	91
All others, acres	71
Total, acres	310

Nuts—	Number bearing trees
Almonds	7,390
Pecans	56
Walnuts	634
Total	8,203

Irrigation.

Number of farms irrigated in 1909	5,310
Acres irrigated in 1909	402,318
Acreage enterprises were capable of irrigating in 1910	560,326
Acreage included in projects	633,652
Main ditches, number	254
Length, miles	831
Laterals, number	688
Length, miles	1,354
Flowing wells, number	3
Pumped wells, number	855
Cost of irrigation enterprises up to July 1, 1910	$1,898,460
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$3.39

Mineral Production in 1914.

	Amount	Value
Brick, thousand	4,500	$3,600
Gold	-----	10,000
Miscellaneous stone	-----	237,963
Natural gas, cubic feet	250,000	15,000
Petroleum, barrels	15,952,190	7,210,389
Quicksilver, flasks	148	7,259
Silver	-----	20
Total		$7,484,231
Number of mineral springs		9

In comparing the data secured in 1910 with that for 1900, it should be remembered that a part of the county was transferred to Kings County in 1909.

Manufactures in 1914.

FRESNO.

The population of Fresno at the census of 1910 was 24,892 and it is estimated that it was 30,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	117	76	-----------
Persons engaged in manufactures	3,330	2,262	47.2
Proprietors and firm members	95	43	-----------
Salaried employees	332	281	18.1
Wage earners (average number)	2,903	1,938	49.8
Primary horsepower	4,080	3,403	19.9
Capital	$7,375,000	$4,933,000	49.5
Services	1,965,000	1,431,000	37.3
Salaries	454,000	328,000	38.4
Wages	1,511,000	1,103,000	37.0
Materials	12,171,000	7,992,000	52.3
Value of products	16,520,000	11,090,000	49.0

GLENN COUNTY.

Date of creation, March 11, 1891.

		1890	1900	1910
Land area, 1,259 square miles.	Population-----	-----	5,150	7,172
County seat, Willows (town).	Population-----	1,176	893	1,139
Population per square mile, 5.7.				

	Highest	Lowest		Inches		Inches
Elevation, 136 feet. 1915: Temperature---	112	26	Rainfall---	27.38	Snow---	0

Glenn County occupies a central position in the Sacramento Valley, extending from the summit of the Coast Range across the Sacramento eastward, one-third being mountainous, but affording good summer pasturage for stock. About the same area is in the foothills, with many fertile ranches, and the remaining third practically a level valley floor of wonderfully fertile soil, which has for the past forty years been continuously cropped to grain and still continues to produce good crops.

The United States Reclamation Service has installed a system to irrigate 14,000 acres of the fertile lands about the town of Orland. This project is designed as a model irrigation system, and was undertaken by the reclamation service to demonstrate the benefits of irrigation under perfect conditions of soil and climate. The works consist of an impounding dam, situated at East Park in Colusa County, a diversion dam at the Buttes in Tehama County, and 99 miles of canals and main laterals, about 100 miles of small field ditches.

Owing to the extensive system of grain farming, and the very limited number of small irrigated farms, the average farm in Glenn County up to recent years was large.

The county roads are excellent. They are graded, graveled, and kept in splendid condition, the gravel in all parts of the county being particularly adapted to road making.

Glenn County is the hunter's paradise. Black bass, striped bass, salmon, perch, catfish, trout, and many other varieties abound in the Sacramento River, and the mountain streams are full of speckled trout, while the heavy growth of brush along the river banks and in the foothills is full of quail, deer, squirrels, and other game, whereas from the middle of November to the first of March, when the wild geese and ducks come into winter quarters, good sport is enjoyed, the hunters killing them by the hundreds.

GLENN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	----------
3 to 9 acres	40
10 to 19 acres	33
20 to 49 acres	106
50 to 99 acres	65
100 to 174 acres	79
175 to 259 acres	31
260 to 499 acres	101
500 to 999 acres	89
1,000 acres and over	119
Total	663
Total in 1900	529

Land and Farm Areas.

Approximate land, acres	805,760
Land in farms in 1910	491,198
Land in farms in 1900	577,363
Improved land in farms in 1910	309,765
Improved land in farms in 1900	355,781
Woodland in farms	67,665
Other unimproved land	113,768

Value of all Farm Property.

Total value in 1910	$16,581,419
Total value in 1900	10,299,300
Per cent increase 1900-1910	61.0
Land in 1910	13,425,220
Land in 1900	8,473,830
Buildings in 1910	1,110,215
Buildings in 1900	719,510
Implements and machinery in 1910	390,333
Implements and machinery in 1900	299,620
Domestic animals, poultry, and bees in 1910	1,655,651
Domestic animals, poultry, and bees in 1900	806,340

GLENN COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	3,688
Other cows	3,601
Yearling heifers	1,410
Calves	2,409
Yearling steers and bulls	1,925
Other steers and bulls	2,051
Total	16,214
Value	*$365,093
Horses—	
Mature horses	3,319
Yearling colts	339
Spring colts	262
Total	3,946
Value	$357,207
Mules—	
Mature mules	3,033
Yearling colts	207
Spring colts	122
Total	3,362
Value	$407,327
Asses and burros—	
Number	29
Value	$17,625
Swine—	
Mature hogs	12,483
Spring pigs	5,827
Total	18,310
Value	$106,475
Sheep—	
Rams, ewes, and wethers	70,210
Spring lambs	41,153
Total	111,363
Value	$363,893
Goats—	
Number	2,813
Value	$5,976
Total value all domestic animals	$1,623,596
Poultry and bees—	
Poultry of all kinds	50,336
Value	$30,715
Colonies of bees	420
Value	$1,340

Principal Crops.

	Acres	Bushels
Corn	671	21,999
Oats	1,283	32,620
Wheat	17,541	232,911
Barley	53,513	1,002,587
Kafir corn and milo maize	162	4,972
Potatoes	24	1,435
Hay and forage—	Acres	Tons
Timothy alone	6	8
Timothy and clover mixed	18	22
Clover alone	5	4
Alfalfa	3,211	10,848
Other tame and cultivated grasses	799	1,045
Wild, salt, or prairie grasses	265	198
Grains cut green	20,824	25,332
All other hay and forage	15	137
Totals	25,143	37,594

Poultry products—	
Poultry raised, number	67,529
Eggs produced, dozen	252,286
Value poultry and eggs produced	$110,010
Honey and wax—	
Honey produced, pounds	10,982
Wax produced, pounds	250
Value of honey and wax produced	$1,194
Wool—	
Wool, fleeces shorn	131,612
Mohair and goat hair, fleeces shorn	5,177
Value wool and mohair produced	$101,749
Special crops—	
Potatoes, acres	24
Sweet potatoes, acres	1
All other vegetables, acres	115
Sugar beets, acres	1,264

Orchard fruits—	Number bearing trees
Apples	4,617
Apricots	6,830
Cherries	78
Peaches and nectarines	6,420
Pears	1,655
Prunes and plums	24,860
Total	44,565

Tropical fruits—	Number bearing trees
Figs	879
Lemons	593
Oranges	4,860
Pomeloes	5
Olives	445
Total	6,783

Grapevines—	
Number in bearing	20,416
Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	4
All others, acres	2
Total	8

Nuts—	Number bearing trees
Almonds	25,739
Pecans	15
Walnuts	220
Total	26,336

Irrigation.

Number of farms irrigated in 1909	196
Acres irrigated in 1909	5,661
Acreage enterprises were capable of irrigating in 1910	16,804
Acreage included in projects	220,661
Main ditches, number	50
Length, miles	136
Laterals, number	554
Length, miles	1,073
Pumped wells, number	105
Cost of irrigation enterprises up to July 1, 1910	$1,519,561
Average cost per acre irrigation enterprises were capable of irrigating in 1910	90.43

Mineral Production in 1914.

	Value
Miscellaneous stone	$30,553
Number of mineral springs	3

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*Includes animals, age and sex not specified.

HUMBOLDT COUNTY.

Date of creation, May 2, 1853.

		1890	1900	1910
Land area, 3,634 square miles.	Population	23,469	27,101	33,857
County seat, Eureka.	Population	4,858	7,327	11,845
Population per square mile, 9.3.				

		Highest	Lowest		Inches		Inches
Elevation, 64 feet.	1915: Temperature	72	28	Rainfall	39.79	Snow	0

Humboldt County has long laid virtually undisturbed in the northwestern part of California. There is no section in the State today where natural resources give so great an opportunity for development.

While the greater portion of the county's surface is hilly, there is considerable level land around Humboldt Bay and along the numerous rivers which flow down from the mountains to the ocean. All of this land, both hill and dale, is very fertile and productive, and is principally utilized for farming, dairying, and fruit raising. The fact has been well established that here can be raised as good fruit of all kinds as in the State. Fruit grown here is nearly altogether free from insect pests; the codling moth, which is so ruinous to the apple business in a great many localities, has not yet gained a foothold here. For the last fifteen years an average of 57,000 boxes of choice apples has been shipped from the county each year.

A great variety of berries grows in profusion in all parts where cultivated, and wild blackberries, huckleberries, and strawberries grow in almost every section of the county. The wild blackberry is especially abundant and of the finest flavor.

There are abundant streams and springs throughout the county, which furnish plenty of pure water to its inhabitants the year round and render irrigation absolutely unnecessary.

Humboldt stands third among the counties of the State in the production of butter and cheese.

Lumbering is the chief industry of the county, the output of the lumber and shingle mills, and sash and door factories is greater than that of any other county in the State, and also contains more standing redwood timber than any other county.

Stock raising is carried on extensively throughout the county, and is one of its most important industries. Gold mining is carried on to some extent along the Klamath and Trinity rivers. Commercial fishing is also an important industry.

The railway from San Francisco has recently been extended through the county to Eureka and on to Trinidad, which will greatly help its development.

(*Information supplied by the Chamber of Commerce.*)

Eureka, the county seat and principal city, had an estimated population of 15,000 on January 1, 1915. Its principal industries are commerce and shipping, lumber manufacture, and general trade.

Arcata, the town next in size, had an estimated population of 2,000 on January 1, 1915. It depends chiefly upon the farming and dairying region surrounding it. Has a barrel stave factory, a tannery, and minor manufactures. Has the Humboldt State Normal School.

Ferndale, estimated population 1,600, is in the heart of the Eel River dairying section. Farming and dairying are the leading industries. Has dry milk plant.

Fortuna, estimated population 1,600, also in the Eel River Valley, depends upon farming, dairying, and lumber manufacturing.

Blue Lake, population, 700, in the Mad River farming district, depends upon farming and dairying.

Loleta, population 400, depends upon dairying and farming. Has a condensed milk plant.

Field's Landing, population 400, depends upon shipping and has the workshops of the Northwestern Pacific Railroad Company.

Scotia, 1,300; Samoa, 1,000, and Korbel, 700, are each sawmill towns, depending almost wholly upon lumber manufacturing.

HUMBOLDT COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	10
3 to 9 acres	78
10 to 19 acres	107
20 to 49 acres	280
50 to 99 acres	245
100 to 174 acres	334
175 to 259 acres	118
260 to 499 acres	147
500 to 999 acres	84
1,000 acres and over	131
Total	1,534
Total in 1900	1,500

Land and Farm Areas.

Approximate land, acres	2,325,760
Land in farms in 1910	642,536
Land in farms in 1900	648,511
Improved land in farms in 1910	105,218
Improved land in farms in 1900	77,238
Woodland in farms	174,354
Other unimproved land	362,934

Value of all Farm Property.

Total value in 1910	$21,230,881
Total value in 1900	13,241,799
Per cent increase 1900-1910	60.3
Land in 1910	16,378,032
Land in 1900	9,524,850
Buildings in 1910	2,054,525
Buildings in 1900	1,282,880
Implements and machinery in 1910	444,280
Implements and machinery in 1900	311,020
Domestic animals, poultry, and bees in 1910	2,354,044
Domestic animals, poultry, and bees in 1900	2,123,049

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	21,572
Other cows	7,837
Yearling heifers	5,531
Calves	8,334
Yearling steers and bulls	3,413
Other steers and bulls	6,590
Total	53,277
Value	*$1,363,050
Horses—	
Mature horses	5,851
Yearling colts	421
Spring colts	131
Total	6,403
Value	$591,639
Mules—	
Mature mules	189
Value	$13,940
Asses and burros—	
Number	11
Value	$350
Swine—	
Mature hogs	7,688
Spring pigs	4,945
Total	12,633
Value	$58,457
Sheep—	
Rams, ewes, and wethers	62,423
Spring lambs	24,650
Total	87,073
Value	$278,763
Goats—	
Number	3,747
Value	$12,477
Total value all domestic animals	$2,318,676
Poultry and bees—	
Poultry of all kinds	54,834
Value	$30,037
Colonies of bees	1,803
Value	$5,331

Principal Crops.

	Acres	Bushels
Corn	253	7,633
Oats	2,823	75,803
Wheat	134	3,370
Barley	1,296	65,991
Dry edible beans	18	392
Potatoes	1,108	156,437

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*Includes animals, age and sex not specified.

HUMBOLDT COUNTY SUMMARY—Continued.

Hay and forage—	Acres	Tons
Timothy alone	174	194
Timothy and clover mixed	109	363
Clover alone	2,459	6,479
Alfalfa	974	3,287
Other tame and cultivated grasses	4,065	9,707
Wild, salt, or prairie grasses	901	1,368
Grains cut green	18,773	35,805
All other hay and forage	2,563	62,410
Totals	30,018	119,613

Poultry products—	
Poultry raised, number	67,310
Eggs produced, dozen	332,115
Value poultry and eggs produced	$115,116

Honey and wax—	
Honey produced, pounds	23,481
Wax produced, pounds	367
Value of honey and wax produced	$2,602

Wool—	
Wool, fleeces shorn	85,212
Mohair and goat hair, fleeces shorn	2,540
Value of wool and mohair produced	$104,430

Special crops—	
Potatoes, acres	1,108
All other vegetables, acres	675

Orchard fruits—	Number bearing trees
Apples	73,010
Apricots	235
Cherries	3,733
Peaches and nectarines	9,471
Pears	3,804
Prunes and plums	26,950
Total	117,203

Tropical fruits—	
Figs	82
Oranges	1
Total	83

Grapevines—	
Number in bearing	4,095

Small fruits—	
Strawberries, acres	58
Blackberries and dewberries	4
All others	25
Total	87

Nuts—	Number bearing trees
Almonds	304
Walnuts	498
Total	802

Irrigation.

Number of farms irrigated in 1909	33
Acres irrigated in 1909	208
Acreage enterprises were capable of irrigating in 1910	333
Acreage included in projects	966
Main ditches, number	33
Length, miles	26
Laterals, number	4
Length, miles	2
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$29,027
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$87.17

Mineral Production in 1914.

	Amount	Value
Brick, thousand	607	$6,120
Gold	-----	19,000
Miscellaneous stone	-----	208,204
Natural gas	-----	150
Silver	-----	100
Total		$233,574
Number of mineral springs		5

Manufactures in 1914.

EUREKA.

The population of Eureka at the census of 1910 was 11,845 and it is estimated that it was 14,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

A comparative summary for the city for 1909 and 1914 follows:

	Census—	
	1914	1909
Number of establishments	57	48
Persons engaged in manufactures	928	1,075
Proprietors and firm members	46	30
Salaried employees	83	99
Wage-earners (average number)	799	946
Primary horsepower	3,707	3,901
Capital	$2,976,000	$3,306,000
Services	729,000	797,000
Salaries	124,000	124,000
Wages	605,000	673,000
Materials	1,217,000	1,494,000
Value of products	2,480,000	3,012,000

IMPERIAL COUNTY.

Date of creation, August 15, 1907.
(Organized from part of San Diego County.)

Land area, 4,089 square miles.
County seat, El Centro (city).
Population per square mile, 3.3.

	1890	1900	1910
Population	-----	-----	13,591
Population	-----	-----	1,610

Calexico (Station):

		Highest	Lowest		Inches		Inches
Elevation, 0 feet.	1915: Temperature	117	28	Rainfall	2.76	Snow	0

Imperial is the youngest county in the State, having been formed in 1907, from the eastern part of San Diego County, formerly known as the "Colorado Desert, or Imperial Valley." The progress of the county is practically confined to the central part of the valley.

Dairying is very profitable, owing to the fact that alfalfa grows throughout the winter, furnishing an abundant supply of green pasturage. Modern creameries, with latest appliances, are located in different sections. In the production of butter the county ranks second, the output being only exceeded by Stanislaus County.

Imperial Valley is one of the best stock, hog, and poultry-producing counties.

The cultivation of cotton holds a most important part in the industrial development of Imperial County.*

Imperial Valley is 110 miles long by 40 miles wide, half in California, half in Mexico. The present irrigated area is 40 by 25 miles in California. Irrigated from the Colorado River, from which 50,000 miner's inches are available. The surface appears to be perfectly level, but slopes gradually northward, affording a sufficient fall for the waters of the irrigation system.

At Brawley there is a large ostrich farm containing some 1,300 birds.

At El Centro, a plant has been established for the manufacture of cottonseed oil, and cottonseed cake on which a large number of cattle are fattened.

(*Information supplied by the Development Agent, El Centro.*)

Imperial County corners off the State of California on the southeast. Over 90 per cent of its population is represented in the Imperial Valley, which in 16 years has been reclaimed from a desert waste and developed until the population today is 45,000, where before there was none, and has an actual property valuation of $90,000,000, where before was worthlessness. It is sometimes referred to as "Barbara Worth's country," being the locale of a novel of similar name.

The present year finds the greatest expansion in the history of the fast-growing valley. Between 90,000 and 100,000 acres have been put in crop for the first time, according to water company reports. Of these, 30,000 are by American planters on the Mexican side of the line, making the acreage in crop there 65,000.

The greatest single crop expansion is in cotton, the acreage in 1916 being 110,000 as compared with 35,000 in 1915. Forty per cent of this is in long staple cotton. An early summer estimate of the value of the cotton crop in Imperial Valley was $7,500,000.

Almost as great an acreage is in barley, or approximately 105,000, half of which is cut for hay and the balance for grain. The barley land is generally used for corn the second half of the year.

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*For details regarding the cotton crop, see pages 85-87.

Another hundred thousand acres in the valley is in alfalfa and is the basis of its live stock farming. Records of the State Dairy Bureau show Imperial as the second butter producing county in the State, and that its production of 6,334,316 pounds in 1915 is four times as much as that of the other southern California counties combined. By contract of the government with one of the creameries operating in the valley, Imperial Valley butter is now being used in supplying the Atlantic squadron.

Imperial Valley is the chief meat supply of southern California, marketing 40,000 head of beef cattle, 35,000 hogs and about 20,000 sheep each year. Cattle brought from ranges as far east as Texas and as far north as Idaho are fattened on valley grass, which grows through the winter.

The chief fruits of the valley are grapefruit, grapes, apricots and melons. It is the largest cantaloupe county in America, shipping 5,000 cars yearly. Besides large yields, its fruits and vegetables are earliest in the market. Ninety thousand dollars in asparagus was shipped from the valley this spring, the first shipment going forward February 8th. Green peas in carload were shipped into New York in carload lots this spring for the first time, selling for $2,500 and netting the grower $1,917.50, according to the Wells Fargo Company. Lettuce was shipped East for the first time in carloads.

Imperial Valley vies with Kansas in turkey production. Its crop is worth $250,000 a year. According to the Southern Pacific Company, 47 cars of honey were shipped out of the valley in 1915. The estimate placed on the total agricultural production of the valley for 1916 is $20,000,000.

The irrigation system which supplies the valley with water from the Colorado River is the largest unit project in the United States and is operated by the people of the valley themselves. Approximately 500,000 acres are in cultivation in the valley. The chief engineer of the system says the present supply of water is safe for 1,200,000 acres and that with the construction of one or two reservoirs, which will store 2,000,000 acre-feet of water, the supply will be adequate for every acre of land susceptible of irrigation from the Colorado River.

IMPERIAL COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	51
3 to 9 acres	46
10 to 19 acres	56
20 to 49 acres	182
50 to 99 acres	227
100 to 174 acres	400
175 to 259 acres	98
260 to 499 acres	201
500 to 999 acres	51
1,000 acres and over	10
Total	1,322
Total in 1900	†

Land and Farm Areas.

Approximate land, acres	2,616,960
Land in farms in 1910	223,662
Land in farms in 1900	†
Improved land in farms in 1910	176,069
Improved land in farms in 1900	†
Woodland in farms	1,138
Other unimproved farms	46,395

Value of all Farm Property.

Total value in 1910	$23,646,067
Total value in 1900	†
Per cent increase 1900-1910	†
Land in 1910	19,832,660
Land in 1900	†
Buildings in 1910	764,665
Buildings in 1900	†
Implements and machinery in 1910	459,535
Implements and machinery in 1900	†
Domestic animals, poultry, and bees in 1910	2,589,207
Domestic animals, poultry, and bees in 1900	†

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†Organized from San Diego County August 15, 1907.

IMPERIAL COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	9,653
Other cows	2,728
Yearling heifers	2,560
Calves	2,772
Yearling steers and bulls	1,379
Other steers and bulls	1,817
Total	22,741
Value	*$865,001
Horses—	
Mature horses	6,277
Yearling colts	580
Spring colts	372
Total	7,229
Value	$798,317
Mules—	
Mature mules	1,583
Yearling colts	69
Spring colts	20
Total	1,672
Value	$233,196
Asses and burros—	
Number	56
Value	$1,569
Swine—	
Mature hogs	45,764
Spring pigs	24,798
Total	70,562
Value	$503,164
Sheep—	
Rams, ewes, and wethers	13,786
Spring lambs	9,553
Total	23,339
Value	$108,504
Goats—	
Number	147
Value	$463
Total value all domestic animals	$2,510,214
Poultry and bees—	
Poultry of all kinds	72,252
Value	$54,117
Colonies of bees	4,740
Value	$24,876

Principal Crops.

	Acres	Bushels
Corn	690	14,419
Oats	30	372
Wheat	125	2,559
Barley	36,986	908,916
Kafir corn and milo maize	9,789	213,781
Potatoes	60	3,347

Hay and forage—	Acres	Tons
Alfalfa	30,847	72,201
Other tame and cultivated grasses	240	210
Wild, salt, or prairie grasses	55	100
Grains cut green	20,995	25,105
All other hay and forage	4,927	4,147
Totals	57,064	101,763

Poultry products—	
Poultry raised, number	84,062
Eggs produced, dozen	264,826
Value of poultry and eggs produced	$135,526
Honey and wax—	
Honey produced, pounds	514,125
Wax produced, pounds	4,453
Value of honey and wax produced	$27,124
Wool—	
Wool, fleeces shorn	12,755
Mohair and goat hair, fleeces shorn	26
Value of wool and mohair produced	$17,067
Special crops—	
Potatoes, acres	60
Sweet potatoes, acres	9
All other vegetables, acres	3,672

Orchard fruits—	Number bearing trees
Apples	86
Apricots	1,922
Peaches and nectarines	432
Prunes and plums	347
Total	3,170

Tropical fruits—	Number bearing trees
Figs	606
Lemons	36
Oranges	1,410
Olives	41
Total	2,411

Grapevines—	
Number in bearing	298,813
Small fruits—	
Blackberries and dewberries, acres	1

Nuts—	Number bearing trees
Almonds	29
Walnuts	24
Total	53

Irrigation.

Number of farms irrigated in 1909	1,250
Acres irrigated in 1909	190,711
Acreage enterprises were capable of irrigating in 1910	242,000
Acreage included in projects	375,000
Main ditches, number	12
Length, miles	117
Laterals, number	179
Length, miles	890
Cost of irrigation enterprises up to July 1, 1910	$4,955,272
Average cost per acre irrigation enterprises were capable of irrigating in 1910	20.48

Mineral Production in 1914.

	Amount	Value
Brick, thousand	4,900	$29,400
Copper, pounds	13,081	1,740
Gold	-----	200,000
Silver	-----	8,000
Total		$239,140
Number of mineral springs		8

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*Includes animals, age or sex not specified.

INYO COUNTY.

Date of creation, March 22, 1866.

		1890	1900	1910
Land area, 10,019 square miles.	Population	3,544	4,377	6,974
County seat, Independence (township).	Population	662	820	701
Population per square mile, 0.7.				

		Highest	Lowest		Inches		Inches
Elevation, 3,907 feet.	1915: Temperature	98	10	Rainfall	3.00	Snow	3.0

Inyo County lies on the eastern side of the Sierra Nevada Range and adjoins Esmeralda and Nye counties, Nevada. On the extreme western edge of the county are the high peaks of the Sierra, rising to altitudes of 14,000 feet and upward and covered throughout the year with snow. From these come numerous streams, which, descending rapidly, unite to form Owens River, flowing southerly along the base of the range to Owens Lake. To the east of this is a succession of ranges and deep valleys of what is known as the Great Basin type, similar to those in southern Nevada. The most noted among these lowlands between the mountains is Death Valley, the bottom of which is reported to be upward of 350 feet below sea level. Borax and similar substances are obtained in these depressions, but beyond these products the desert area has little present value.

Inyo, the second largest county, has the most diversified topography in the State, claiming as it does Mount Whitney, the highest elevation, and Death Valley, the lowest depression. The Sierras, which form its western border, here attain their greatest altitude, there being many towering peaks scarcely inferior to Whitney itself.

All the agricultural land is contained in Owens Valley. This valley is about 100 miles long; at its northern end it is about 15 miles wide, narrowing to 2 miles half way down its length, where a spur of the Sierra almost divides it, and south of that broadening to an average of 6 to 8 miles.

The soil of Owens Valley is especially fertile. Grains and garden produce of all kinds are grown to perfection.

INYO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	28
10 to 19 acres	28
20 to 49 acres	55
50 to 99 acres	75
100 to 174 acres	113
175 to 259 acres	41
260 to 499 acres	54
500 to 999 acres	22
1,000 acres and over	20
Total	438
Total in 1900	424

Land and Farm Areas.

Approximate land, acres	6,412,160
Land in farms in 1910	116,142
Land in farms in 1900	141,059
Improved land in farms in 1910	38,698
Improved land in farms in 1900	43,740
Woodland in farms	1,631
Other unimproved land	69,813

Value of all Farm Property.

Total value in 1910	$7,112,903
Total value in 1900	2,571,629
Per cent increase 1900-1910	176.6
Land in 1910	5,210,586
Land in 1900	1,584,750
Buildings in 1910	558,740
Buildings in 1900	317,060
Implements and machinery in 1910	189,810
Implements and machinery in 1900	95,590
Domestic animals, poultry, and bees in 1910	1,153,767
Domestic animals, poultry, and bees in 1900	574,229

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,267
Other cows	8,970
Yearling heifers	2,583
Calves	2,255
Yearling steers and bulls	2,445
Other steers and bulls	1,788
Total	20,308
Value	$428,853

INYO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	7,074
Yearling colts	555
Spring colts	403
Total	5,032
Value	$453,277
Mules—	
Mature mules	249
Yearling colts	55
Spring colts	33
Total	337
Value	$31,960
Asses and burros—	
Number	309
Value	$5,845
Swine—	
Mature hogs	1,795
Spring pigs	1,560
Total	3,355
Value	$21,631
Sheep—	
Rams, ewes, and wethers	17,240
Spring lambs	26,106
Total	43,346
Value	$156,319
Goats—	
Number	2,846
Value	$6,596
Total value all domestic animals	$1,104,481
Poultry and bees—	
Poultry of all kinds	30,132
Value	$20,590
Colonies of bees	5,868
Value	$28,696

Principal Crops.

	Acres	Bushels
Corn	1,883	57,917
Oats	573	28,875
Wheat	1,715	50,858
Barley	678	19,381
Dry edible beans	70	1,055
Potatoes	326	52,894

Hay and forage—	Acres	Tons
Timothy alone	22	43
Timothy and clover mixed	1,906	3,589
Clover alone	12	15
Alfalfa	12,440	37,059
Other tame and cultivated grasses	697	893
Wild, salt, or prairie grasses	1,076	1,681
Grains cut green	28	49
All other hay and forage	28	276
Totals	16,209	43,605

Poultry products—	
Poultry raised, number	50,007
Eggs produced, dozen	146,952
Value poultry and eggs produced	$67,836
Honey and wax—	
Honey produced, pounds	312,620
Wax produced, pounds	2,131
Value honey and wax produced	$29,944
Wool—	
Wool, fleeces shorn	17,847
Mohair and goat hair, fleeces shorn	505
Value wool and mohair produced	$27,761
Special crops—	
Potatoes, acres	326
All other vegetables, acres	240

Orchard fruits—	Number bearing trees
Apples	19,611
Apricots	342
Cherries	539
Peaches and nectarines	4,602
Pears	2,668
Prunes and plums	2,349
Total	30,164

Tropical fruits—	Number bearing trees
Figs	14
Grapevines—	
Number in bearing	39,478
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	8
All others, acres	8
Total	21

Nuts—	Number bearing trees
Almonds	28
Pecans	9
Walnuts	35
Total	72

Irrigation.

Number of farms irrigated in 1909	408
Acres irrigated in 1909	65,163
Acreage enterprises were capable of irrigating in 1910	71,815
Acreage included in projects	92,319
Main ditches, number	184
Length, miles	396
Laterals, number	326
Length, miles	168
Flowing wells, number	10
Pumped wells, number	1
Cost of irrigation enterprises up to July 1, 1910	$962,698
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$13.41

Mineral Production in 1914.

	Amount	Value
Borax, tons	49,297	$1,133,831
Copper, pounds	336,423	44,744
Gold	-----	275,000
Lead, pounds	4,626,934	180,450
Marble, cubic feet	3,500	10,500
Salt, tons	13,500	54,000
Silver	-----	255,000
Soapstone, tons	390	2,060
Zinc, pounds	399,641	20,381
Other minerals	-----	115,396
Total		$2,091,362
Number of mineral springs		36

KERN COUNTY.

Date of creation, April 2, 1866.

Land area, 8,003 square miles.
County seat, *Bakersfield (city).
Population per square mile, 4.7.

	1890	1900	1910
Population	9,808	16,480	37,715
Population	2,626	4,836	12,727

Elevation, 404 feet.

1915:	Temperature Highest	Lowest	Rainfall Inches	Snow Inches
	115	26	9.04	T

Kern County, situated at the extreme southern end of the San Joaquin Valley, its easterly boundary extending on to the Mojave Desert over the extreme southerly end of the Sierra Nevada Mountains, is the third largest county in the State.

At Randsburg, on the eastern border, is one of the largest gold mines on this coast, and the country around Randsburg has many smaller mines.

Along the southern border where the line crosses the San Emidio Mountains are large deposits of iron ore and antimony, which are yet undeveloped. Along the western side of the county are the Sunset, Midway, McKittrick and Lost Hills oil fields, lying along the eastern base of the Coast Range Mountains.

In the northern part of the county, and surrounding the town of Delano, is a large body of good land. Rice has been successfully grown in the county for several years.

In the northeastern part is the mining town of Kernville, surrounded by mines, and near it on the south fork of the Kern River is the South Fork Valley, where numerous stockmen have their alfalfa fields that furnish feed to the stock that pasture in the high Sierra in the summer time.

In the center, and surrounding the town of Bakersfield, the county seat, lie thousands of acres of fertile land that are irrigated by Kern River, and which are mostly used to raise stock and alfalfa, but large quantities of fruit, including oranges, are also raised in the county. The acreage in apricots, peaches, prunes, pears, olives, and oranges has increased very considerably in the last five years.

In the oil fields the development work is continuous. Lost Hills is being developed, and the discoveries there indicate that the petroleum-bearing territory is continuous from Sunset to the north line of the county.

Kern County is a long way ahead of all others in the value of minerals produced, amounting in 1914 to $28,047,957. The greater part of this sum is derived from the extensive oil fields.

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*Kern City annexed to Bakersfield in 1909.

KERN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	11
3 to 9 acres	46
10 to 19 acres	57
20 to 49 acres	320
50 to 99 acres	173
100 to 174 acres	222
175 to 259 acres	55
260 to 499 acres	116
500 to 999 acres	82
1,000 acres and over	85
Total	1,167
Total in 1900	1,098

Land and Farm Areas.

Approximate land, acres	5,121,920
Land in farms in 1910	1,403,350
Land in farms in 1900	1,571,106
Improved land in farms in 1910	315,387
Improved land in farms in 1900	324,031
Woodland in farms	235,014
Other unimproved land	852,949

Value of all Farm Property.

Total value in 1910	$30,405,013
Total value in 1900	14,246,125
Per cent increase 1900-1910	113.4
Land in 1910	23,962,202
Land in 1900	10,404,540
Buildings in 1910	1,252,139
Buildings in 1900	664,120
Implements and machinery in 1910	614,028
Implements and machinery in 1900	347,640
Domestic animals, poultry, and bees in 1910	4,576,644
Domestic animals, poultry, and bees in 1900	2,829,825

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	6,917
Other cows	38,101
Yearling heifers	8,441
Calves	7,372
Yearling steers and bulls	6,459
Other steers and bulls	21,271
Total	118,320
Value	*$3,051,957
Horses—	
Mature horses	8,670
Yearling colts	987
Spring colts	530
Total	10,347
Value	$1,013,562
Mules—	
Mature mules	1,099
Yearling colts	103
Spring colts	46
Total	1,248
Value	$146,095
Asses and burros—	
Number	130
Value	$12,543
Swine—	
Mature hogs	13,376
Spring pigs	7,137
Total	20,513
Value	$167,439
Sheep—	
Rams, ewes, and wethers	19,801
Spring lambs	10,516
Total	30,317
Value	$114,137
Goats—	
Number	930
Value	$3,305
Total value all domestic animals	$4,509,038
Poultry and bees—	
Poultry of all kinds	75,900
Value	$51,438
Colonies of bees	4,501
Value	$16,168

Principal Crops.

	Acres	Bushels
Corn	466	7,132
Oats	82	770
Wheat	12,924	139,375
Barley	32,492	517,029
Kafir corn and milo maize	2,813	45,828
Dry edible beans	26	648
Potatoes	339	51,666

Hay and forage—	Acres	Tons
Alfalfa	23,600	73,259
Other tame and cultivated grasses	12	12
Wild, salt, or prairie grasses	148	105
Grains cut green	30,069	35,441
All other hay and forage	5,126	4,178
Totals	58,955	112,995

Poultry products—	
Poultry raised, number	89,520
Eggs produced, dozen	394,130
Value poultry and eggs produced	$148,062
Honey and wax—	
Honey produced, pounds	204,920
Wax produced, pounds	2,832
Value of honey and wax produced	$12,159
Wool—	
Wool, fleeces shorn	24,177
Mohair and goat hair, fleeces shorn	355
Value wool and mohair produced	$26,540
Special crops—	
Potatoes, acres	339
Sweet potatoes, acres	31
All other vegetables, acres	589

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*Includes animals, age or sex not specified.

KERN COUNTY SUMMARY—Continued.

Orchard fruits—	Number bearing trees
Apples	7,725
Apricots	33,573
Cherries	163
Peaches and nectarines	35,149
Pears	1,057
Prunes and plums	58,075
Total	136,088

Tropical fruits—	Number bearing trees
Figs	1,475
Lemons	54
Oranges	80,940
Pomeloes	16
Olives	393
Total	82,888

Grapevines—	
Number in bearing	419,582

Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	26
All others, acres	6
Total, acres	34

Nuts—	Number bearing trees
Almonds	3,101
Pecans	563
Walnuts	127
Total	3,819

Irrigation.

Number of farms irrigated in 1909	876
Acres irrigated in 1909	190,034
Acreage enterprises were capable of irrigating in 1910	217,418
Acreage included in projects	402,806
Main ditches, number	178
Length, miles	441
Laterals, number	118
Length, miles	257
Flowing wells, number	25
Pumped wells, number	140
Cost of irrigation enterprises up to July 1, 1910	$1,788,635
Average cost per acre irrigation enterprises were capable of irrigating in 1910	8.23

Mineral Production in 1914.

	Amount	Value
Brick, thousand	3,834	$29,214
Clay, tons	346	172
Copper, pounds	7,394	983
Gold	------	600,000
Gypsum, tons	82	320
Lead, pounds	379	15
Lime, barrels	81,600	65,100
Natural gas, M cu. ft.	6,508,868	390,532
Petroleum, barrels	65,332,633	26,721,046
Salt, tons	20,000	50,000
Silver	------	10,000
Other minerals	------	180,575
Totals		$28,047,957
Number of mineral springs		26

Manufactures in 1914.

BAKERSFIELD.

The population of Bakersfield at the census of 1910 was 12,727, and it is estimated that it was 16,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

The salaries and wages amounted to $1,026,000 in 1914 and to $758,000 in 1909, the increase being $268,000, or 35.4 per cent.

The number of salaried employees was 109 in 1914, as compared with 78 in 1909, making an increase of 31.

The average number of wage-earners was 895 in 1914 and 746 in 1909, the increase being 149, or 20 per cent.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase. 1909-1914[1]
	1914	1909	
Number of establishments	51	27	----------
Persons engaged in manufactures	1,046	844	23.9
Proprietors and firm members	42	20	----------
Salaried employees	109	78	----------
Wage earners (average number)	895	746	20.0
Primary horsepower	2,450	910	169.2
Capital	$2,749,000	$1,791,000	53.5
Services	1,026,000	758,000	35.4
Salaries	147,000	94,000	56.4
Wages	879,000	664,000	32.4
Materials	1,623,000	1,700,000	—4.5
Value of products	2,928,000	2,819,000	3.9

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[1] A minus sign (—) denotes decrease.

KINGS COUNTY.

Date of creation, March 22, 1893; organized from part of Tulare County; extended in 1909 by annexation of part of Fresno County.

Land area, 1,159 square miles.
County seat, Hanford (city).
Population per square mile, 14.0.

	1890	1900	1910
Population	-----	9,871	16,230
Population	942	2,929	4,829

	Highest	Lowest	Inches	Inches
Elevation, 249 feet. 1915: (No observation station).				

In the very heart of the great fertile valley of the San Joaquin lies Kings County, one of the smallest, one of the youngest, but one of the richest counties of this State.

There are no rocks to contend with, no land to clean, no hills and hollows to level.

Wheat and other kinds of grain were in former years the most important products of Kings County soil. Immense tracts of land were originally sown and great crops gathered in, but with the subdividing of the land into smaller holdings, the growing of grain is not so extensive an industry at the present time.

Viticulture is an industry that has assumed large proportions. There are nearly 5,000,000 grapevines in the county.

Barley and alfalfa form two of the leading products.

Sugar beets are a great factor in Kings County prosperity. The discovery a few years ago that a great deal of what seemed to be almost waste land is particularly well adapted to the raising of this product, has changed the whole face of the county in some parts. About Corcoran, where the erection of a large sugar factory has opened up a market, the growing of beets is being prosecuted very extensively.

Dairying ranks secondary to fruit and grape culture. There are many creameries and skimming stations located so as to be in convenient touch with all sections of the county, and there is a constant and ever-increasing demand for butter fat.

The Kings River supplies most of the water required for irrigation, but Cross Creek or Kaweah River, at the easterly end of the county, a stream of lesser proportions, does its full share in this work of irrigation. It was in 1872 that the plan of irrigating from these streams was first put into practical operation. The principal irrigating companies at present operating in the county are the People's Ditch Company, the Last Chance Ditch Company, the Lemoore Canal and Irrigation Company, the Lakeside Ditch Company, and other smaller ones are also in operation.

(*Information supplied by the Chamber of Commerce.*)

Estimated population in 1915, Hanford, 6,250; Kings County, 21,450.

The live stock amounted to $1,320,00; the butter and cream $1,700,000; the grain, $1,686,250; the fruit, $2,015,000; the alfalfa forage crop, $1,750,000. This total of $8,471,250 does not include poultry, nuts, melons, honey, small fruits and a great variety of other products sold and consumed in the county.

KINGS COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	69
10 to 19 acres	159
20 to 49 acres	613
50 to 99 acres	377
100 to 174 acres	287
175 to 259 acres	77
260 to 499 acres	133
500 to 999 acres	42
1,000 acres and over	43
Total*	1,837
Total in 1900	932

Land and Farm Areas.

Approximate land, acres	741,760
Land in farms in 1910	373,823
Lands in farms in 1909	387,505
Improved land in farms in 1910	196,569
Improved land in farms in 1900	262,148
Woodland in farms	6,724
Other unimproved land	170,530

Value of all Farm Property.

Total value in 1910	$33,312,292
Total value in 1900	5,921,907
Land in 1910	26,007,591
Land in 1900	3,420,410
Buildings in 1910	2,145,975
Buildings in 1900	811,920
Implements and machinery in 1910	654,971
Implements and machinery in 1900	348,330
Domestic animals, poultry, and bees in 1910	4,503,755
Domestic animals, poultry, and bees in 1900	1,341,247

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	18,593
Other cows	21,655
Yearling heifers	7,281
Calves	8,793
Yearling steers and bulls	3,745
Other steers and bulls	14,908
Total	74,975
Value	$2,481,281
Horses—	
Mature horses	9,417
Yearling colts	1,174
Spring colts	882
Total	11,473
Value	$1,256,415
Mules—	
Mature mules	855
Yearling colts	142
Spring colts	72
Total	1,069
Value	$148,430
Asses and burros—	
Number	23
Value	$10,077
Swine—	
Mature hogs	22,775
Spring pigs	17,858
Total	40,633
Value	$295,301
Sheep—	
Rams, ewes and wethers	40,483
Spring lambs	21,891
Total	62,374
Value	$233,005
Goats—	
Number	507
Value	$1,902
Total value all domestic animals	$4,426,411
Poultry and bees—	
Poultry of all kinds	102,747
Value	$59,708
Colonies of bees	4,690
Value	$17,630

Principal Crops.

	Acres	Bushels
Corn	2,274	43,688
Oats	109	4,490
Wheat	8,684	141,978
Barley	19,287	402,432
Kafir corn and milo maize	3,931	95,010
Dry edible beans	21	576
Potatoes	194	17,658

Hay and forage—	Acres	Tons
Clover alone	13	51
Alfalfa	36,778	123,112
Other tame and cultivated grasses	2,023	2,025
Wild, salt, or prairie grasses	833	734
Grains cut green	17,629	28,629
All other hay and forage	473	3,755
Totals	57,749	158,306

Poultry products—	
Poultry raised, number	153,839
Eggs produced, dozen	687,052
Value poultry and eggs produced	$248,495
Honey and wax—	
Honey produced, pounds	238,791
Wax produced, pounds	3,148
Value of honey and wax produced	$12,028
Wool—	
Wool, fleeces shorn	73,393
Mohair and goat hair, fleeces shorn	261
Value of wool and mohair produced	$58,836

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*202 miles of Fresno and 96 miles of Tulare counties were annexed in 1909.

KINGS COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Special crops—	
Potatoes, acres	194
Sweet potatoes, acres	19
All other vegetables, acres	674
Sugar beets, acres	504

Orchard fruits—	Number bearing trees
Apples	4,106
Apricots	124,007
Cherries	11
Peaches and nectarines	777,697
Pears	4,379
Prunes and plums	132,192
Total	1,048,506

Tropical fruits—	Number bearing trees
Figs	391
Oranges	24
Olives	5
Total	425

Grapevines—	
Number in bearing	4,538,732

Small fruits—	
Strawberries, acres	15
Blackberries and dewberries, acres	13
All others, acres	3
Total	31

Nuts—	Number bearing trees
Almonds	1,721
Pecans	2
Walnuts	24
Total	1,747

Irrigation.

Number of farms irrigated in 1909	1,126
Acres irrigated in 1909	190,949
Acreage enterprises were capable of irrigating in 1910	289,523
Acreage included in projects	310,523
Main ditches, number	27
Length, miles	137
Laterals, number	51
Length, miles	159
Flowing wells, number	75
Pumped wells, number	20
Cost of irrigation enterprises up to July 1, 1910	$687,381
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$2.37

Mineral Production in 1914.

	Amount	Value
Fuller's earth, tons	20	$160
Gypsum, tons	20	80
Natural gas, cubic feet	150,000	500
Total		$740

LAKE COUNTY.

Date of creation, May 20, 1861.

		1890	1900	1910
Land area, 1,278 square miles.	Population	7,101	6,017	5,526
County seat, Lakeport (town).	Population	991	726	870
Population per square mile, 4.3.				

Upper Lake (Station):		Highest	Lowest		Inches		Inches
Elevation, 1,350 feet.	1915: Temperature	*	*	Rainfall	*	Snow	*

The county is located in the heart of the Coast Range, about 100 miles north of San Francisco, and is about 75 miles long and 25 miles wide. Mount St. Helena guards the southern extremity. Clear Lake is a splendid sheet of fresh water 25 miles long and from 2 to 10 miles broad, with the lake surface at an elevation of 1,350 feet above sea level. It is stocked with a large quantity of fish. Clear Lake is the pride of Lake County, as well as the source of its name.

Although classed as mountainous, Lake County has a number of very fertile valleys, some of them being of large area. The acreage in farm crops is small compared with most other counties, but a considerable quantity of peas and beans are raised for canning purposes. Artesian water is obtainable in profuse quantities.

The rocky hillsides furnish pasturage for flocks of Angora goats. Large bodies of sugar and yellow pine, fir, cedar, and oak give employment to several sawmills and furnish the home market a good quality of lumber.

The minerals have heretofore been represented by the quicksilver industry. Besides quicksilver, immense quantities of mineral water have been bottled at the many mineral springs and shipped to all parts of the country. Lake County has fifty-six mineral springs, or more than any other county in the State.

LAKE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	10
10 to 19 acres	38
20 to 49 acres	85
50 to 99 acres	80
100 to 174 acres	144
175 to 259 acres	60
260 to 499 acres	84
500 to 999 acres	53
1,000 acres and over	48
Total	603
Total in 1900	723

Land and Farm Areas.

Approximate land, acres	817,920
Land in farms in 1910	217,464
Land in farms in 1900	212,176
Improved land in farms in 1910	42,768
Improved land in farms in 1900	41,414
Woodland in farms	71,388
Other unimproved land	103,308

Value of all Farm Property.

Total value in 1910	$6,271,615
Total value in 1900	3,495,090
Per cent increase 1900-1910	79.4
Land in 1910	4,792,480
Land in 1900	2,419,280
Buildings in 1910	782,735
Buildings in 1900	524,180
Implements and machinery in 1910	207,211
Implements and machinery in 1900	111,420
Domestic animals poultry, and bees in 1910	489,189
Domestic animals, poultry, and bees in 1900	440,210

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	1,487
Other cows	2,113
Yearling heifers	821
Calves	1,133
Yearling steers and bulls	574
Other steers and bulls	1,286
Total	7,414
Value	$148,781
Horses—	
Mature horses	2,172
Yearling colts	216
Spring colts	104
Total	2,492
Value	$210,382

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*No records.

LAKE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	182
Yearling colts	45
Spring colts	36
Total	263
Value	$22,015
Asses and burros—	
Number	10
Value	$2,730
Swine—	
Mature hogs	5,301
Spring pigs	2,737
Total	8,038
Value	$39,239
Sheep—	
Rams, ewes, and wethers	7,436
Spring lambs	3,511
Total	10,947
Value	$27,167
Goats—	
Number	9,018
Value	$21,114
Total value all domestic animals	$471,728
Poultry and bees—	
Poultry of all kinds	27,435
Value	$17,086
Colonies of bees	276
Value	$675

Principal Crops.

	Acres	Bushels
Corn	981	26,317
Oats	843	19,914
Wheat	2,563	46,131
Barley	2,825	54,758
Potatoes	182	21,773

Hay and forage—	Acres	Tons
Timothy alone	50	60
Timothy and clover mixed	104	180
Clover alone	330	452
Alfalfa	2,795	7,260
Other tame and cultivated grasses	385	391
Wild, salt, or prairie grasses	1,152	1,316
Grains cut green	7,810	9,351
All other hay and forage	27	79
Totals	12,653	19,089

Poultry products—	
Poultry raised, number	37,976
Eggs produced, dozen	135,001
Value poultry and eggs produced	$56,581
Honey and wax—	
Honey produced, pounds	5,105
Wax produced, pounds	43
Value of honey and wax produced	$455

Wool—	
Wool, fleeces shorn	10,372
Mohair and goat hair, fleeces shorn	6,603
Value wool and mohair produced	$12,922
Special crops—	
Potatoes, acres	182
All other vegetables, acres	353

Orchard fruits—	Number bearing trees
Apples	22,254
Apricots	1,463
Cherries	590
Peaches and nectarines	9,288
Pears	39,075
Prunes and plums	47,244
Total	120,037

Tropical fruits—	Number bearing trees
Figs	1,062
Lemons	8
Oranges	72
Olives	3,198
Total	4,340

Grapevines—	
Number in bearing	296,752
Small fruits—	
Strawberries, acres	6
Blackberries and dewberries, acres	15
All others, acres	4
Total	25

Nuts—	Number bearing trees
Almonds	8,281
Pecans	6
Walnuts	564
Total	8,920

Irrigation.

Number of farms irrigated in 1909	43
Acres irrigated in 1909	582
Acreage enterprises were capable of irrigating in 1910	828
Acreage included in projects	1,268
Main ditches, number	44
Length, miles	26
Laterals, number	21
Length, miles	2
Flowing wells, number	1
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$12,124
Average cost per acre irrigation enterprises were capable of irrigating in 1910	14.64

Mineral Production in 1914.

	Amount	Value
Mineral water, gallons	254,150	$47,267
Quicksilver, flasks	331	16,236
Total		$63,503
Number of mineral springs		56

LASSEN COUNTY.

Date of creation, April 1, 1864.

Land area, 4,531 square miles.
County seat, Susanville (town).
Population per square mile, 1.1.

	1890	1900	1910
Population	4,239	4,511	4,802
Population	-----	-----	688

	Highest	Lowest		Inches		Inches
Elevation, 4,175 feet. 1915: Temperature	99	3	Rainfall	*	Snow	*

Lassen County lies in the northeastern part of California along the Nevada line. It is traversed from south to north by the Nevada-California-Oregon Railway (narrow gauge), which connects at Reno, Nevada, with the Southern Pacific system. Susanville, the county seat, is in Honey Lake Valley, a little south of the center of the county. Lassen embraces large areas, comprising rich valley lands, suited to agriculture; rolling hills and uplands, affording splendid range for stock, and mountain tablelands covered with timber.

The principal present industries are farming and stock raising.

The altitude of the largest, most fertile, and most productive valleys, such as Honey Lake Valley, Big Valley, and Long Valley, is a little over 4,000 feet. Other large valleys, like Madeline Plains, Willow Creek Valley, and Secret Valley, are in the neighborhood of 5,000 feet above sea level. While the high valleys are not as well adapted to general farming as the lower ones, they are quite productive, and well suited to the stock-raising business. The climate generally is similar to that of the northeastern states, so far as range of temperature is concerned, but the summer season is quite dry, making irrigation necessary as a rule. Of farm products, alfalfa is probably the most important, though native grasses, timothy, and redtop are extensively raised.

Good hay and grass and pure cold water make the county an ideal one for dairying. There are a number of creameries in the county.

LASSEN COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	9
10 to 19 acres	4
20 to 49 acres	12
50 to 99 acres	32
100 to 174 acres	117
175 to 259 acres	51
260 to 499 acres	130
500 to 999 acres	84
1,000 acres and over	63
Total	502
Total in 1900	555

Land and Farm Areas.

Approximate land, acres	2,899,840
Land in farms in 1910	295,728
Land in farms in 1900	381,109
Improved land in farms in 1910	122,057
Improved land in farms in 1900	133,266
Woodland in farms	27,688
Other unimproved land	145,983

Value of all Farm Property.

Total value in 1910	$9,376,809
Total value in 1900	5,365,615
Per cent increase 1900-1910	74.8
Land in 1910	6,331,832
Land in 1900	2,949,510
Buildings in 1910	765,460
Buildings in 1900	708,010
Implements and machinery in 1910	289,287
Implements and machinery in 1900	255,220
Domestic animals, poultry, and bees in 1910	1,990,230
Domestic animals, poultry, and bees in 1900	1,452,875

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,890
Other cows	18,444
Yearling heifers	5,975
Calves	4,906
Yearling steers and bulls	5,456
Other steers and bulls	6,161
Total	43,832
Value	$871,941

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*No records.

LASSEN COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	7,548
Yearling colts	1,406
Spring colts	561
Total	9,515
Value	$702,420
Mules—	
Mature mules	414
Yearling colts	185
Spring colts	103
Total	702
Value	$60,681
Asses and burros—	
Number	119
Value	$20,220
Swine—	
Mature hogs	3,079
Spring pigs	1,955
Total	5,034
Value	$30,513
Sheep—	
Rams, ewes, and wethers	42,490
Spring lambs	30,235
Total	72,725
Value	$291,592
Goats—	
Number	586
Value	$1,832
Total value all domestic animals	$1,979,199
Poultry and bees—	
Poultry of all kinds	19,297
Value	$9,957
Colonies of bees	298
Value	$1,074

Principal Crops.

	Acres	Bushels
Corn	4	93
Oats	977	25,647
Wheat	9,938	153,863
Barley	3,244	63,471
Potatoes	259	35,703

Hay and forage—	Acres	Tons
Timothy alone	295	649
Timothy and clover mixed	9,475	13,239
Alfalfa	11,709	27,452
Other tame and cultivated grasses	1,723	2,836
Wild, salt, or prairie grasses	36,879	45,016
Grains cut green	2,677	3,442
Total	62,758	92,634

Poultry products—	
Poultry raised, number	28,907
Eggs produced, dozen	106,897
Value of poultry and eggs produced	$161,289

Honey and wax—	
Honey produced, pounds	5,642
Wax produced, pounds	5
Value of honey and wax produced	$643
Wool—	
Wool, fleeces shorn	36,768
Mohair and goat hair, fleeces shorn	2,088
Value wool and mohair produced	$55,154
Special crops—	
Potatoes, acres	259
Sugar beets, acres	2
All other vegetables, acres	184

Orchard fruits—	Number bearing trees
Apples	12,679
Apricots	70
Cherries	439
Peaches and nectarines	1,455
Pears	632
Prunes and plums	2,223
Total	17,511

Grapevines—	
Number in bearing	31
Small fruits—	
Strawberries, acres	3
Blackberries and dewberries, acres	2
All others, acres	15
Total	20

Nuts—	Number bearing trees
Almonds	8
Walnuts	8
Total	16

Irrigation.

Number of farms irrigated in 1909	355
Acres irrigated in 1909	77,079
Acreage enterprises were capable of irrigating in 1910	89,815
Acreage included in projects	149,530
Main ditches, number	295
Length, miles	368
Laterals, number	263
Length, miles	116
Cost of irrigation enterprises up to July 1, 1910	$884,965
Average cost per acre irrigation enterprises were capable of irrigating in 1910	9.85

Mineral Production in 1914.

	Amount	Value
Copper, pounds	19,089	$2,539
Gold	-----	1,000
Miscellaneous stone	-----	775
Silver	-----	10
Total		$4,324
Number of mineral springs		19

LOS ANGELES COUNTY.

Date of creation, February 18, 1850.

Land area, 4,067 square miles.
County seat, Los Angeles.
Population per square mile, 124.0.

	1890	1900	1910
Population	101,454	170,298	504,131
Population	50,395	102,479	319,198

		Highest	Lowest		Inches		Inches
Elevation, 293 feet.	1915: Temperature	99	38	Rainfall	16.67	Snow	T

In wealth, population, and resources Los Angeles is the most important county in southern California. There are two rivers in the county, the Los Angeles and the San Gabriel. During a large part of the year these are dry beds of sand, what little water they contain finding its way through the porous sand to the bedrock. In the winter they are dangerous streams. The Los Angeles River rises in the western part of the San Fernando Valley, about 12 miles northwest of the city, and flows easterly 18 miles to the Los Angeles Pass. Its stream is fed all along by springs. Turning south, it flows through the Los Angeles Pass, and on through the city.

Los Angeles County embraces within its limits a great variety of scenery and climate. Within its territory may be found the climate and scenery of almost every part of the State, from the cool and breezy seashore to the warm inland plains and bracing mountain tops. Of the area of the county, about four-fifths is capable of cultivation, the remainder being mountainous. The shore line is 85 miles in length. Nine-tenths of the population is within thirty miles of the ocean.

The chief industry is horticulture, the list of products including everything that can be grown in the State. The area of land devoted to horticultural purposes is being rapidly extended as the large tracts are subdivided and improved.

Perhaps the most important enterprise for Los Angeles is the big breakwater by the Federal Government at San Pedro. Other shipping points of the county are Port Los Angeles, near Santa Monica, and Redondo.

The San Gabriel Valley, a choice section of Los Angeles County, has the Sierra Madre Range on the north. The mountains are grand and precipitous, enclosing the valley like a wall. This valley is the best known of any portion of southern California.

The valley contains 100 square miles of territory. The San Gabriel contains some of the choicest fruit lands in southern California, and is largely devoted to the raising of oranges and lemons, as well as deciduous fruits.

Pasadena, a beautiful city, is located at the foot of the Sierra Madre Range, about seven miles from Los Angeles. Within twenty years Pasadena has grown from a sheep pasture to a city of beautiful homes.

Adjoining San Gabriel Valley on the east is Pomona Valley. Irrigation is cheaply supplied to this section from the San Antonio River. The soil and climate are particularly adapted to the culture of citrus fruits. It contains a number of flourishing towns, the chief of which is Pomona, one of the most thriving cities in southern California.

The development of the horticultural industry during the past few years has been remarkable. The most important horticultural product is the orange. Besides the orange and lemon, the principal fruits raised are the almond, fig, prune, apricot, walnut, peach, pear, and berries. Deciduous fruits are shipped fresh, canned, dried, and crystallized.

Ostriches are raised for their plumes, and the industry is profitable. There is a large ostrich farm at South Pasadena.

San Pedro is the headquarters of the tunny fish industry, which was only established three or four years ago, but the pack has steadily increased. In 1911, 42,000 cases were packed; in 1913, 115,000, and in 1914, 325,000 cases.

LOS ANGELES COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	438
3 to 9 acres	2,125
10 to 19 acres	1,820
20 to 49 acres	1,709
50 to 99 acres	698
100 to 174 acres	531
175 to 259 acres	192
260 to 499 acres	207
500 to 999 acres	114
1,000 acres and over	85
Total	7,919
Total in 1900	6,577

Land and Farm Areas.

Approximate land, acres	2,602,880
Land in farms in 1910	757,985
Land in farms in 1900	895,663
Improved land in farms in 1910	418,998
Improved land in farms in 1900	518,744
Woodland in farms	18,051
Other unimproved land	320,936

Value of all Farm Property.

Total value in 1910	$199,998,200
Total value in 1900	74,817,646
Per cent increase 1900-1910	167.3
Land in 1910	180,354,798
Land in 1900	61,189,220
Buildings in 1910	11,798,273
Buildings in 1900	6,702,710
Implements and machinery in 1910	2,462,387
Implements and machinery in 1900	1,433,050
Domestic animals, poultry, and bees in 1910	*5,382,742
Domestic animals, poultry, and bees in 1900	2,492,666

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	20,524
Other cows	8,027
Yearling heifers	5,561
Calves	6,211
Yearling steers and bulls	1,666
Other steers and bulls	1,106
Total	43,095
Value	$1,473,509
Horses—	
Mature horses	20,375
Yearling colts	1,376
Spring colts	673
Total	22,424
Value	$2,479,207
Mules—	
Mature mules	2,459
Yearling colts	76
Spring colts	35
Total	2,570
Value	$390,200
Asses and burros—	
Number	84
Value	$3,806
Swine—	
Mature hogs	18,418
Spring pigs	10,524
Total	28,942
Value	$230,390
Sheep—	
Rams, ewes, and wethers	22,261
Spring lambs	8,830
Total	31,091
Value	$136,536
Goats—	
Number	8,238
Value	$20,839
Total value all domestic animals	$4,734,487
Poultry and bees—	
Poultry of all kinds	513,965
Value	$547,968
Colonies of bees	25,930
Value	99,762

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*Including Belgian hares valued at $525.

LOS ANGELES COUNTY SUMMARY—Continued.

Principal Crops.

	Acres	Bushels
Corn	9,084	249,295
Oats	973	38,720
Wheat	6,760	59,866
Barley	32,804	785,129
Kafir corn and milo maize	106	2,145
Dry edible beans	3,874	105,011
Potatoes	4,140	413,151

Hay and forage—	Acres	Tons
Timothy alone	25	45
Clover alone	52	152
Alfalfa	19,027	100,855
Other tame and cultivated grasses	2,160	2,943
Wild, salt, or prairie grasses	651	793
Grain cut green	129,978	189,856
All other hay and forage	2,155	21,897
Totals	154,048	316,541

Poultry products—	
Poultry raised, number	586,566
Eggs produced, dozen	2,332,397
Value poultry and eggs produced	951,299
Honey and wax—	
Honey produced, pounds	1,289,820
Wax produced, pounds	15,501
Value of honey and wax produced	$93,569
Wool—	
Wool, fleeces shorn	31,754
Mohair and goat hair, fleeces shorn	230
Value wool and mohair produced	$32,366
Special crops—	
Potatoes, acres	4,140
Sweet potatoes, acres	342
All other vegetables, acres	13,385
Sugar beets, acres	14,191

Orchard fruits—	Number bearing trees
Apples	101,433
Apricots	122,769
Cherries	795
Peaches and nectarines	160,197
Pears	16,149
Prunes and plums	43,592
Total	446,698

Tropical fruits—	Number bearing trees
Figs	15,736
Lemons	219,149
Oranges	1,674,695
Pomeloes	6,853
Olives	84,934
Total	1,994,402

Grapevines—	
Number in bearing	4,923,877
Small fruits—	
Strawberries, acres	1,380
Blackberries and dewberries, acres	280
All others, acres	315
Total	1,975

Nuts—	Number bearing trees
Almonds	76,949
Pecans	313
Walnuts	281,837
Total	359,349

Irrigation.

Number of farms irrigated in 1909	4,669
Acres irrigated in 1909	145,586
Acreage enterprises were capable of irrigating in 1910	183,506
Acreage included in projects	241,794
Main ditches, number	601
Length, miles	800
Laterals, number	494
Length, miles	500
Flowing wells, number	376
Pumped wells, number	1,673
Cost of irrigation enterprises up to July 1, 1910	$7,817,023
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$42.60

Mineral Production in 1914.

	Amount	Value
Borax, tons	13,203	$349,669
Brick, thousand	133,557	1,214,971
Clay, tons	8,263	14,566
Gems	-----	2,100
Mineral water, gallons	331,151	8,025
Miscellaneous stone	-----	953,434
Natural gas, cubic feet	1,250,000	75,000
Petroleum, barrels	3,558,690	1,957,279
Potash, tons	10	460
Salt, tons	20,000	60,000
Total		$4,665,504
Number of mineral springs		14

Manufactures in 1914.

LOS ANGELES.

The population of Los Angeles at the census of 1910 was 319,198, and it is estimated that it was 439,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	1,911	1,325	44.2
Persons engaged in manufactures	31,532	21,875	44.1
Proprietors and firm members	1,767	1,181	49.6
Salaried employees	6,029	3,367	79.1
Wage-earners (average number)	23,744	17,327	37.0
Primary horsepower	64,665	33,166	95.0
Capital	$101,681,000	$59,518,000	70.8
Services	26,025,000	16,500,000	57.7
Salaries	7,748,000	3,912,000	98.0
Wages	18,277,000	12,588,000	45.2
Materials	58,941,000	38,913,000	51.5
Value of products	103,458,000	68,586,000	50.8
Value added by manufacture (value of products less cost of materials)	44,517,000	29,673,000	50.0

POMONA.

The population of Pomona at the census of 1910 was 10,207 and it is estimated that it was 12,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	54	30	----------
Persons engaged in manufactures	459	285	61.0
Proprietors and firm members	63	32	----------
Salaried employees	74	29	----------
Wage-earners (average number)	322	224	43.8
Primary horsepower	806	334	141.3
Capital	$1,192,000	$629,000	89.5
Services	275,000	173,000	59.0
Salaries	61,000	21,000	190.5
Wages	214,000	152,000	40.8
Materials	324,000	230,000	40.9
Value of products	825,000	559,000	47.6
Value added by manufacture (value of products less cost of materials)	501,000	329,000	52.3

LONG BEACH.

The population of Long Beach at the census of 1910 was 17,809, and it is estimated that it was 24,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	94	51	----------
Persons engaged in manufactures	1,128	413	173.1
Proprietors and firm members	82	49	----------
Salaried employees	161	87	----------
Wage earners (average number)	885	277	219.5
Primary horsepower	2,999	1,450	106.8
Capital	$3,229,000	$1,326,000	143.5
Services	805,000	294,000	173.8
Salaries	199,000	87,000	128.7
Wages	606,000	207,000	192.8
Materials	1,546,000	498,000	210.4
Value of products	2,945,000	927,000	217.7
Value added by manufacture (value of products less cost of materials)	1,399,000	429,000	226.1

PASADENA.

The population of Pasadena at the census of 1910 was 30,291, and it is estimated that it was 41,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show hat the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	118	88	----------
Persons engaged in manufactures	821	708	16.0
Proprietors and firm members	120	92	----------
Salaried employees	148	117	26.5
Wage-earners (average number)	553	499	10.8
Primary horsepower	1,782	969	83.9
Capital	$1,601,000	$1,347,000	18.8
Services	585,000	497,000	17.7
Salaries	156,000	117,000	33.3
Wages	429,000	380,000	12.9
Materials	869,000	853,000	1.9
Value of products	1,972,000	1,724,000	14.4
Value added by manufacture (value of products less cost of materials)	1,103,000	871,000	26.6

MADERA COUNTY.

Date of creation, March 11, 1893.

Land area, 2,112 square miles.
County seat, Madera (city).
Population per square mile, 4.0.

	1890	1900	1910
Population	-----	6,364	8,368
Population	-----	-----	2,404

Storey (Station):	Highest	Lowest		Inches		Inches
Elevation, 296 feet. 1915: Temperature	107	21	Rainfall	12.63	Snow	0

Madera County is in the center of the San Joaquin Valley, bounded on the north by Merced and Mariposa counties, on the southeast and west by Fresno County, from which it was formed in 1893. The eastern portion of the county extends far up in the Sierra Nevada Mountains. From the foothills to the San Joaquin River, a distance of about forty miles, the land is level and adapted to all kinds of agricultural pursuits. The melting snows of the mountains flow through numerous small creeks into the San Joaquin River, or serve to supply the farming section with water for irrigation. The higher mountains are heavily timbered with valuable wood, principally sugar and white pine. Lumbering, stock raising, quarrying, mining, fruit growing, and farming are the principal industries. There are two large wineries in the county. The power plant of the San Joaquin Light and Power Company is near North Fork, in this county. The granite quarries at Knowles furnish employment to a large number of men.

San Francisco post office and many other public and business buildings in various cities of the State are built of the granite from these quarries.

(*Information supplied by the Chamber of Commerce.*)

The valley climate of Madera County boasts three hundred sunny days during the year, with sufficient rainfall for grain, hay, grapes and similar crops. The dairymen depend on irrigation to obtain the best results from alfalfa fields, and many fruit growers also use much water for their crops.

Irrigation water is now secured chiefly from wells, which at a shallow depth give good supply. About 10,000 acres is the extent supplied from sources other than wells, but there is strong agitation for the formation of an immense irrigation district, to bring gravity water from the San Joaquin and Fresno rivers to an area of 100,000 acres or more. To further this the Madera County Irrigation Bureau was organized and has done active work.

This county, until recently, was one of large individual land holdings. A single firm owned over 200,000 acres; another 108,000 acres; thousand-acre ranches were not considered large. Now the big holders are beginning to subdivide and the modest rancher who seeks to make a living on forty, sixty or eighty acres, is coming more and more into his own. Alfalfa fed to hogs and cows is one of the chief sources of gain. A large co-operative creamery in Madera monthly disburses thousands of dollars to dairymen. Fruits do well, raisins, figs and olives being among the chief money-makers. On the mountain and foothill farms apples attain delicious flavor. Away from the valley there remains some government land open to entry. The total was increased recently by an order throwing open tracts before held in the

National Forest. Much of this is excellent for cattle grazing and a portion can be cleared and profitably farmed.

The Mother Lode of the Sierra Nevadas extends into this county and along it are located many gold mines, some of which have earned records as producers. Farther back are vast deposits of iron ore and some copper. These are difficult of access and development has been greatly retarded on this account. Iron ore from the Minarets district runs 65 to 70 per cent. There are known deposits of lead, tin, zinc, tungsten, cobalt, asbestos and platinum and the problem of their development is one of transportation. Listed among the largest granite quarries in the State, those near Raymond have supplied stone for San Francisco's city hall, post office and other beautiful granite structures throughout the West.

In 1915 the lumber cut here was 35,000,000 feet—sugar pine and yellow pine, fir and incense cedar. The government owns many million feet of standing timber in this vicinity, offered for sale on terms imposed to insure adequate and scientific development.

The Mariposa Big Tree Grove skirts Madera County and the mountain highways offer great scenic beauties to the tourist bound for Yosemite Valley, just beyond its borders.

The state highway intersects Madera County, north and south.

MADERA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	----------
3 to 9 acres	13
10 to 19 acres	21
20 to 49 acres	76
50 to 99 acres	23
100 to 174 acres	151
175 to 259 acres	27
260 to 499 acres	66
500 to 999 acres	59
1,000 acres and over	137
Total	573
Total in 1900	523

Land and Farm Areas.

Approximate land, acres	1,351,680
Land in farms in 1910	620,663
Land in farms in 1900	484,659
Improved land in farms in 1910	391,086
Improved land in farms in 1900	277,721
Woodland in farms	41,612
Other unimproved land	187,965

Value of all Farm Property.

Total value in 1910	$14,984,395
Total value in 1900	5,916,894
Per cent increase 1900-1910	153.3
Land in 1910	12,263,638
Land in 1900	4,588,770
Buildings in 1910	771,595
Buildings in 1900	433,050
Implements and machinery in 1910	441,455
Implements and machinery in 1900	214,100
Domestic animals, poultry, and bees in 1910	1,507,707
Domestic animals, poultry, and bees in 1900	680,974

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	1,592
Other cows	12,406
Yearling heifers	2,425
Calves	2,975
Yearling steers and bulls	2,252
Other steers and bulls	3,946
Total	27,905
Value	*$582,792
Horses—	
Mature horses	3,498
Yearling colts	334
Spring colts	238
Total	4,070
Value	$386,856
Mules—	
Mature mules	2,928
Yearling colts	154
Spring colts	59
Total	3,141
Value	$454,606
Asses and burros—	
Number	49
Value	$9,301
Swine—	
Mature hogs	4,444
Spring pigs	2,409
Total	6,853
Value	$36,151

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*Includes animals, age and sex not specified.

MADERA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes, and wethers	6,269
Spring lambs	3,837
Total	10,106
Value	$23,145
Goats—	
Number	278
Value	$717
Total value all domestic animals	$1,493,768
Poultry and bees—	
Poultry of all kinds	23,246
Value	$13,024
Colonies of bees	375
Value	$1,115

Principal Crops.

	Acres	Bushels
Corn	1	50
Oats	10,569	175,047
Wheat	39,468	370,499
Barley	90,341	1,170,945
Kafir corn and milo maize	343	4,948
Dry edible beans	15	333
Potatoes	75	6,662

Hay and forage—	Acres	Tons
Timothy alone	5	6
Alfalfa	5,735	16,717
Other tame and cultivated grasses	60	73
Wild, salt, or prairie grasses	516	423
Grain cut green	11,283	12,757
All other hay and forage	7	2
Total	17,606	29,978

Poultry products—	
Poultry raised, number	28,137
Eggs produced, dozen	67,932
Value poultry and eggs produced	$29,336
Honey and wax—	
Honey produced, pounds	16,439
Wax produced, pounds	370
Value of honey and wax produced	$1,052
Wool—	
Wool, fleeces shorn	4,905
Mohair and goat hair, fleeces shorn	60
Value wool and mohair produced	$2,272
Special crops—	
Potatoes, acres	75
Sweet potatoes, acres	2
All other vegetables, acres	256

Orchard fruits—	Number bearing trees
Apples	20,576
Apricots	9,408
Cherries	40
Peaches and nectarines	40,989
Pears	1,185
Prunes and plums	7,570
Total	80,156

Tropical fruits—	Number bearing trees
Figs	4,321
Lemons	15
Oranges	184
Pomelos	2
Olives	18,010
Total	22,532

Grapevines—	--
Number in bearing	1,530,630
Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	3
All others, acres	2
Total	7

Nuts—	Number bearing trees
Almonds	2,778
Pecans	5
Walnuts	14
Total	2,797

Irrigation.

Number of farms irrigated in 1909	158
Acres irrigated in 1909	38,705
Acreage enterprises were capable of irrigating in 1910	51,230
Acreage included in projects	82,321
Main ditches, number	34
Length, miles	79
Laterals, number	30
Length, miles	294
Pumped wells, number	33
Cost of irrigation enterprises up to July 1, 1910	$512,098
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$10.00

Mineral Production in 1914.

	Amount	Value
Copper, pounds	35,359	$4,703
Gold	-----	5,000
Miscellaneous stone	-----	192,764
Pumice, tons	50	1,000
Silver	-----	50
Total		$203,517
Number of mineral springs		10

MARIN COUNTY.

Date of creation, February 18, 1850.

Land area, 529 square miles.
County seat, San Rafael (city).
Population per square mile, 47.5.

	1890	1900	1910
Population	13,072	15,702	25,114
Population	3,290	3,879	5,934

Point Reyes (Station):

		Highest	Lowest		Inches		Inches
Elevation, 490 feet.	1915: Temperature	77	34	Rainfall	24.85	Snow	0

Marin County is decidedly one of water frontage, being bounded on the west and south by the Pacific Ocean and by the Golden Gate, which separates it from San Francisco by only a mile and a half at its nearest point, and on the east by San Francisco Bay.

The topographical features are rolling hills and numerous small valleys. A part of the Coast Range crosses Marin in a northwesterly and southeasterly direction, and much of the surface of the county is broken and hilly, but a considerable portion immediately on the shore is composed of marsh and overflowed lands. A part of the Coast Range crosses the county, the highest point of which is Mount Tamalpais, which has an elevation of 2,375 feet.

The principal industry is dairying, but of late years attention has been paid to fruit growing.

At Tomales are located the largest oyster beds in the State.

MARIN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	35
10 to 19 acres	54
20 to 49 acres	36
50 to 99 acres	30
100 to 174 acres	35
175 to 259 acres	40
260 to 499 acres	72
500 to 999 acres	111
1,000 acres and over	79
Total	498
Total in 1900	462

Land and Farm Areas.

Approximate land, acres	338,560
Land in farms in 1910	263,442
Land in farms in 1900	322,374
Improved land in farms in 1910	93,115
Improved land in farms in 1900	47,533
Woodland in farms	49,978
Other unimproved land	120,349

Value of all Farm Property.

Total value in 1910	$12,426,158
Total value in 1900	10,866,511
Per cent increase 1900-1910	14.4
Land in 1910	9,384,625
Land in 1900	8,330,450
Buildings in 1910	1,156,830
Buildings in 1900	914,020
Implements and machinery in 1910	343,482
Implements and machinery in 1900	207,110
Domestic animals, poultry, and bees in 1910	1,541,221
Domestic animals, poultry, and bees in 1900	1,414,931

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	24,803
Other cows	3,564
Yearling heifers	2,880
Calves	6,509
Yearling steers and bulls	567
Other steers and bulls	641
Total	39,266
Value	*$1,016,404
Horses—	
Mature horses	2,338
Yearling colts	166
Spring colts	54
Total	2,558
Value	$248,075
Mules—	
Mature mules	11
Total	11
Value	$980
Swine—	
Mature hogs	8,812
Spring pigs	7,287
Total	16,099
Value	$126,569
Sheep—	
Rams, ewes, and wethers	1,930
Spring lambs	1,025
Total	2,955
Value	$14,391

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*Includes animals, age and sex not specified

MARIN COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Goats—	
Number	147
Value	$576
Total value all domestic animals	$1,436,975
Poultry and bees—	
Poultry of all kinds	203,277
Value	$104,178
Colonies of bees	20
Value	$68

Principal Crops.

	Acres	Bushels
Corn	52	2,061
Oats	850	31,430
Wheat	57	1,155
Barley	16	231
Dry edible beans	1	8
Potatoes	435	33,469

Hay and forage—	Acres	Tons
Timothy alone	80	200
Clover alone	80	80
Alfalfa	25	86
Other tame and cultivated grasses	3,428	5,600
Wild, salt, or prairie grasses	169	179
Grains cut green	13,055	20,787
All other hay and forage	623	11,040
Totals	17,460	37,972

Poultry products—	
Poultry raised, number	141,629
Eggs produced, dozen	1,465,911
Value poultry and eggs produced	$422,837
Honey and wax—	
Honey produced, pounds	205
Wax produced, pounds	55
Value of honey and wax produced	$49
Wool—	
Wool, fleeces shorn	2,823
Value wool and mohair produced	$2,816
Special crops—	
Potatoes, acres	435
All other vegetables, acres	117

Orchard fruits—	Number bearing trees
Apples	15,995
Apricots	1,689
Cherries	165
Peaches and nectarines	6,313
Pears	4,151
Prunes and plums	3,775
Total	32,268

Tropical fruits—	Number bearing trees
Figs	201
Lemons	26
Oranges	79
Pomeloes	5
Olives	48
Total	387

Grapevines—	
Number in bearing	115,198
Small fruits—	
Strawberries, acres	1
All others	2
Total	3

Nuts—	Number bearing trees
Almonds	151
Walnuts	61
Total	212

Irrigation.

Number of farms irrigated in 1909	6
Acres irrigated in 1909	67
Acreage enterprises were capable of irrigating in 1910	71
Acreage included in projects	71
Main ditches, number	5
Length, miles	5
Pumped wells, number	1
Cost of irrigation enterprises up to July 1, 1910	$3,380
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$17.61

Mineral Production in 1914.

	Amount	Value
Brick, thousand	15,000	$55,000
Mineral water, gallons	60,000	9,000
Miscellaneous stone		490,137
Total		$554,137
Number of mineral springs		4

MARIPOSA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 1,463 square miles.	Population	3,787	4,720	3,956
County seat, Mariposa (township).	Population	697	1,009	654
Population per square mile, 2.7.				

Yosemite (Station):	Highest	Lowest		Inches		Inches
Elevation, 3,945 feet. 1915: Temperature	--	10	Rainfall	35.51	Snow	83.3

The county reaches eastward from the edge of the San Joaquin plains across the foothills far into the Sierra Nevada Mountains, its altitude varying from 300 to 13,000 feet, Mount Dana, the highest point of land, reaching an elevation of 13,627 feet.

There are about 300,000 acres of plains and lower foothills together, the latter predominating, and the balance consists of high hills and mountains; bare of timber on the plains, then scattering oak and scrub pines, then rising to immense tracts of sugar and yellow pine, fir, spruce, and cedar, and the giant sequoias of Mariposa Big Tree Grove, which contains some 427 trees, many of 35 feet in diameter and 150 to 300 feet high. The county is well provided with natural water in the Merced, Mariposa, and Chowchilla rivers. The famous Yosemite Valley is located in the eastern part of this county, at an elevation of 4,060 feet, with walls 5,000 feet higher. The Merced River flows through the valley.

There are three mining belts in the county—the Mother Lode with its offshoots, the east belt, and the copper belt.

Irrigation is practiced to some extent, water being taken from streams and mining ditches, and used with good results.

The cattle and sheep are ranged in the mountains in the summer and in the valleys and plains during the winter.

MARIPOSA COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	1
10 to 19 acres	4
20 to 49 acres	4
50 to 99 acres	21
100 to 174 acres	97
175 to 259 acres	15
260 to 499 acres	101
500 to 999 acres	51
1,000 acres and over	33
Total	330
Total in 1900	381

Land and Farm Areas.

Approximate land, acres	936,320
Land in farms in 1910	206,059
Land in farms in 1900	160,156
Improved land in farms in 1910	37,017
Improved land in farms in 1900	14,003
Woodland in farms	85,150
Other unimproved land	83,892

Value of all Farm Property.

Total value in 1910	$2,829,235
Total value in 1900	1,328,151
Per cent increase 1900-1910	113.0
Land in 1910	1,817,100
Land in 1900	752,090
Buildings in 1910	276,180
Buildings in 1900	207,640
Implements and machinery in 1910	79,403
Implements and machinery in 1900	59,960
Domestic animals, poultry, and bees in 1910	656,552
Domestic animals, poultry, and bees in 1900	308,461

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	905
Other cows	7,477
Yearling heifers	1,602
Calves	2,115
Yearling steers and bulls	1,683
Other steers and bulls	2,876
Total	16,671
Value	*$370,521

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*Includes animals, age and sex not specified.

MARIPOSA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	1,896
Yearling colts	218
Spring colts	126
Total	2,240
Value	$182,986
Mules—	
Mature mules	201
Yearling colts	46
Spring colts	49
Total	296
Value	$30,565
Asses and burros—	
Number	83
Value	$10,183
Swine—	
Mature hogs	6,160
Spring pigs	2,722
Total	8,882
Value	$46,704
Sheep—	
Rams, ewes, and wethers	877
Spring lambs	304
Total	1,181
Value	$4,409
Goats—	
Number	931
Value	$2,365
Total value all domestic animals	$647,733
Poultry and bees—	
Poultry of all kinds	12,217
Value	$8,668
Colonies of bees	34
Value	$151

Principal Crops.

	Acres	Bushels
Corn	174	2,330
Oats	55	1,100
Wheat	124	1,298
Barley	1,434	19,130
Dry edible beans	62	409
Potatoes	76	8,537
Hay and forage—	Acres	Tons
Timothy alone	65	100
Timothy and clover mixed	29	34
Clover alone	25	6
Alfalfa	28	97
Other tame and cultivated grasses	177	223
Wild, salt, or prairie grasses	685	659
Grains cut green	5,472	4,884
All other hay and forage	40	46
Total	6,521	6,049

Poultry products—	
Poultry raised, number	19,583
Eggs produced, dozen	49,728
Value poultry and eggs produced	$28,844

Honey and wax—	
Honey produced, pounds	300
Wax produced, pounds	25
Value of honey and wax produced	$51
Wool—	
Wool, fleeces shorn	355
Mohair and goat hair, fleeces shorn	154
Value wool and mohair produced	$376
Special crops—	
Potatoes, acres	76
All other vegetables, acres	193

Orchard fruits—	Number bearing trees
Apples	16,001
Apricots	233
Cherries	120
Peaches and nectarines	1,618
Pears	701
Prunes and plums	762
Total	19,461

Tropical fruits—	Number bearing trees
Figs	461
Lemons	35
Oranges	1,169
Pomeloes	1
Olives	2,711
Total	4,378

Grapevines—	
Number in bearing	28,647
Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	2
All others, acres	4
Total	7

Nuts—	Number bearing trees
Almonds	159
Walnuts	91
Total	262

Irrigation.

Number of farms irrigated in 1909	56
Acres irrigated in 1909	376
Acreage enterprises were capable of irrigating in 1910	546
Acreage included in projects	767
Main ditches, number	49
Length, miles	21
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$13,440
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$24.62

Mineral Production in 1914.

	Amount	Value
Barytes, tons	2,000	$3,000
Copper, pounds	277,472	36,904
Gold	-----	132,000
Marble, cubic feet	100	100
Miscellaneous stone	-----	15,366
Silver	-----	500
Total		$187,870
Number of mineral springs		4

MENDOCINO COUNTY.

Date of creation, February 18, 1850.

Land area, 3,453 square miles.
County seat, Ukiah, city.
Population per square mile, 6.9.

	1890	1900	1910
Population	17,612	20,465	23,929
Population	1,627	1,850	2,136

		Highest	Lowest		Inches		Inches
Elevation, 620 feet. 1915:	Temperature	108	20	Rainfall	50.69	Snow	0

Mendocino County has 100 miles of coast line. In general topography it is mountainous, with valleys lying between the mountain chains and along the coast. It, together with the counties of Humboldt and Trinity, embodies the greater part of the northern Coast Range Mountains, and contains their highest peaks and deepest canyons, fertile valleys, wooded slopes, rushing rivers, and picturesque scenery. It shares with Sonoma, Humboldt, and Del Norte the glory of the great redwood belt.

The county has a length of 85 miles from north to south, and the width is 45 miles from east to west. It is traversed the entire length by the Coast Range, which is composed of two parallel ridges. These mountains vary in height from 1,000 feet to 3,000 feet. Their lower slopes have a gentle declivity, while the higher portions are generally precipitous and furrowed with ravines and gulches. There are many small productive valleys throughout the county.

Mendocino is well watered with the numerous streams which take their rise in the mountain chain which intersects her territory. The Eel River, running north, and the Russian River, running south, have their sources in this county, and are the principal streams.

Stock raising, grazing, and wool growing are very much in evidence.

The Angora goat thrives well, the mountains being an ideal pasture.

Hops are a very prolific crop.

No irrigation is required, and crops do not suffer from drought at any time.

In the county are large tracts of redwood, and it also has a large number of mineral springs.

MENDOCINO COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	42
10 to 19 acres	61
20 to 49 acres	166
50 to 99 acres	151
100 to 174 acres	334
175 to 259 acres	131
260 to 499 acres	193
500 to 999 acres	124
1,000 acres and over	154
Total	1,356
Total in 1900	1,452

Land and Farm Areas.

Approximate land, acres	2,209,920
Land in farms in 1910	721,325
Land in farms in 1900	742,924
Improved land in farms in 1910	82,578
Improved land in farms in 1900	73,907
Woodland in farms	247,758
Other unimproved land	390,989

Value of all Farm Property.

Total value in 1910	$14,659,467
Total value in 1900	8,587,516
Per cent increase 1900-1910	70.7
Land in 1910	10,774,439
Land in 1900	5,810,250
Buildings in 1910	1,816,135
Buildings in 1900	1,081,090
Implements and machinery in 1910	375,049
Implements and machinery in 1900	219,630
Domestic animals, poultry, and bees in 1910	1,693,844
Domestic animals, poultry, and bees in 1900	1,446,546

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	6,454
Other cows	9,280
Yearling heifers	3,054
Calves	3,980
Yearling steers and bulls	2,503
Other steers and bulls	4,883
Total	30,154
Value	$597,588

MENDOCINO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	5,300
Yearling colts	510
Spring colts	184
Total	5,994
Value	$541,605
Mules—	
Mature mules	298
Yearling colts	10
Spring colts	1
Total	309
Value	$27,421
Asses and burros—	
Number	29
Value	$1,240
Swine—	
Mature hogs	14,600
Spring pigs	7,469
Total	22,069
Value	$102,615
Sheep—	
Rams, ewes, and wethers	88,760
Spring lambs	41,010
Total	129,770
Value	$377,121
Goats—	
Number	3,927
Value	$10,215
Total value all domestic animals	$1,657,805
Poultry and bees—	
Poultry of all kinds	56,807
Value	$34,665
Colonies of bees	441
Value	$1,374

Principal Crops.

	Acres	Bushels
Corn	533	14,454
Oats	3,087	81,959
Wheat	3,906	59,195
Barley	1,904	43,370
Dry edible beans	5	44
Potatoes	616	78,909

Hay and forage—	Acres	Tons
Timothy alone	180	228
Timothy and clover mixed	489	578
Clover alone	350	556
Alfalfa	2,401	6,253
Other tame and cultivated grasses	5,895	6,884
Wild, salt, or prairie grasses	1,164	1,178
Grains cut green	16,429	21,356
All other hay and forage	107	1,052
Totals	27,015	38,085

Poultry products—	
Poultry raised, number	64,935
Eggs produced, dozen	337,781
Value of poultry and eggs produced	$121,577
Honey and wax—	
Honey produced, pounds	6,090
Wax produced, pounds	34
Value of honey and wax produced	$667
Wool—	
Wool, fleeces shorn	149,260
Mohair and goat hair, fleeces shorn	2,315
Value wool and mohair produced	$158,918
Special crops—	
Potatoes, acres	616
All other vegetables, acres	594

Orchard fruits—	Number bearing trees
Apples	63,263
Apricots	187
Cherries	1,181
Peaches and nectarines	6,928
Pears	15,829
Prunes and plums	37,197
Total	125,282

Tropical fruits—	Number bearing trees
Figs	358
Oranges	4
Olives	7
Total	369

Grapevines—	
Number in bearing	924,191
Small fruits—	
Strawberries, acres	22
Blackberries and dewberries, acres	14
All others	21
Total	57

Nuts—	Number bearing trees
Almonds	229
Walnuts	360
Total	589

Irrigation.

Number of farms irrigated in 1909	39
Acres irrigated in 1909	371
Acreage enterprises were capable of irrigating in 1910	590
Acreage included in projects	1,365
Main ditches, number	33
Length, miles	19
Laterals, number	8
Length, miles	6
Pumped wells, number	6
Cost of irrigation enterprises up to July 1, 1910	$30,297
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$51.35

Mineral Production in 1914.

	Value
Miscellaneous stone	$560
Number of mineral springs	35

MERCED COUNTY.

Date of creation, April 19, 1855.

Land area, 1,995 square miles.
County seat, Merced, city.
Population per square mile, 7.6.

	1890	1900	1910
Population	8,085	9,215	15,148
Population	2,009	1,969	3,102

Elevation, 173 feet.	Highest	Lowest		Inches		Inches
1915: Temperature	108	21	Rainfall	12.65	Snow	0

Merced County possesses as good land as is to be found anywhere in the San Joaquin Valley for fruit and alfalfa, but its development has been retarded by large land holdings, and grain growing has been the principal occupation. Within recent years, however, thousands of acres have been subdivided into colony lots and placed on the market.

The good roads movement is receiving its due amount of consideration in the county, and the different supervisorial districts have built several miles of new roads, with the expectation of extending them as fast as possible. The county is particularly fortunate in being able to secure a high grade of road material from the nearby rock crusher at Jasper, on the line of the Yosemite Valley Railroad, and at reasonable cost.

The creamery industry has developed so rapidly that Merced County is now one of the leading counties in the production of cream.

Merced County excels in the quantity and quality of its sweet potatoes. The fig industry is yet in its infancy, but it has been proven that the soil and climatic conditions are favorable for figs and olives, peaches and grapes.

Numerous rivers and creeks traverse the county, furnishing a natural water supply. There are two irrigation systems, one on the east side and the other on the west side of the San Joaquin River. The main canal on the east side is 65 feet wide at the bottom and 100 feet wide on top and 10 feet deep, the carrying capacity being 4,000 cubic feet per second.

MERCED COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	86
10 to 19 acres	213
20 to 49 acres	694
50 to 99 acres	295
100 to 174 acres	165
175 to 259 acres	46
260 to 499 acres	89
500 to 999 acres	100
1,000 acres and over	167
Total	1,856
Total in 1900	999

Land and Farm Areas.

Approximate land, acres	1,276,800
Land in farms in 1910	1,162,167
Land in farms in 1900*	1,702,967
Improved land in farms in 1910	607,742
Improved land in farms in 1900	613,376
Woodland in farms	49,818
Other unimproved land	504,607

Value of all Farm Property.

Total value in 1910	$49,520,913
Total value in 1900	22,636,859
Per cent increase 1900-1910	118.8
Land in 1910	40,047,324
Land in 1900	18,449,650
Buildings in 1910	2,338,587
Buildings in 1900	984,040
Implements and machinery in 1910	804,625
Implements and machinery in 1900	501,480
Domestic animals, poultry, and bees in 1910	6,330,377
Domestic animals, poultry, and bees in 1900	2,701,689

Domestic Animals on Farms and Ranges.

Cattle†—	
Dairy cows	19,678
Other cows	43,250
Yearling heifers	14,858
Calves	14,625
Yearling steers and bulls	11,036
Other steers and bulls	34,767
Total	150,467
Value	†$4,343,845

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*By an error the acreage was reported in 1900 as 1,702,967, instead of 1,666,973.
†Includes animals, age and sex not specified.

MERCED COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	10,308
Yearling colts	1,453
Spring colts	795
Total	12,556
Value	$1,063,537
Mules—	
Mature mules	3,673
Yearling colts	198
Spring colts	204
Total	4,075
Value	$182,209
Asses and burros—	
Number	107
Value	$17,432
Swine—	
Mature hogs	19,414
Spring pigs	10,121
Total	29,535
Value	$185,474
Sheep—	
Rams, ewes, and wethers	28,044
Spring lambs	11,724
Total	39,768
Value	$152,708
Goats—	
Number	5,246
Value	$21,272
Total value all domestic animals	$6,266,477
Poultry and bees—	
Poultry of all kinds	83,998
Value	$51,943
Colonies of bees	4,072
Value	$11,957

Principal Crops.

	Acres	Bushels
Corn	1,877	52,778
Oats	19,843	338,041
Wheat	10,399	115,938
Barley	88,145	2,009,531
Kafir corn and milo maize	2,206	45,770
Dry edible beans	523	5,839
Potatoes	246	18,882
Hay and forage—	Acres	Tons
Timothy alone	5	7
Clover alone	79	317
Alfalfa	37,842	144,357
Other tame and cultivated grasses	784	680
Wild, salt, or prairie grasses	10,308	7,228
Grains cut green	19,751	20,293
All other hay and forage	148	453
Totals	68,917	173,335

Poultry products—	
Poultry raised, number	136,305
Eggs produced, dozen	454,115
Value poultry and eggs produced	$184,810
Honey and wax—	
Honey produced, pounds	204,098
Wax produced, pounds	3,150
Value of honey and wax produced	$10,993

Wool—	
Wool, fleeces shorn	46,908
Mohair and goat hair, fleeces shorn	8,400
Value wool and mohair produced	$39,400
Special crops—	
Potatoes, acres	246
Sweet potatoes, acres	2,114
All other vegetables, acres	380
Sugar beets, acres	2

Orchard fruits—	Number bearing trees
Apples	8,941
Apricots	7,381
Cherries	343
Peaches and nectarines	134,991
Pears	5,704
Prunes and plums	5,401
Total	163,013

Tropical fruits—	Number bearing trees
Figs	9,837
Lemons	209
Oranges	1,572
Pomeloes	11
Olives	6,981
Total	18,613

Grapevines—	
Number in bearing	1,281,342
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	21
All others, acres	8
Total	34

Nuts—	Number bearing trees
Almonds	17,132
Pecans	31
Walnuts	633
Total	17,845

Irrigation.

Number of farms irrigated in 1909	1,417
Acres irrigated in 1909	151,998
Acreage enterprises were capable of irrigating in 1910	248,670
Acreage included in projects	281,719
Main ditches, number	45
Length, miles	261
Laterals, number	353
Length, miles	352
Flowing wells, number	29
Pumped wells, number	78
Cost of irrigation enterprises up to July 1, 1910	$3,748,211
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$15.07

Mineral Production in 1914.

	Value
Gold*	$112,000
Silver*	500
Total	$112,500

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*Including output of one dredge in Stanislaus County.

MODOC COUNTY.

Date of creation, February 17, 1874.

		1890	1900	1910
Land area, 3,823 square miles.	Population	4,986	5,076	6,191
County seat, Alturas, town.	Population			916
Population per square mile, 1.6.				

		Highest	Lowest		Inches		Inches
Elevation, 4,400 feet. 1915:	Temperature	103	—10	Rainfall	9.98	Snow	31.5

Modoc County is in the extreme northeastern corner of California. The county is a succession of mountain ranges and valleys branching off from the Sierra Nevada Mountains, the principal spur of which is the Warner Range. It is principally drained by Pit River, which flows into the Sacramento, near Redding, Shasta County. The lava bed section occupies over one-half the total area. The county has two large lakes, but barring the lakes and the large cattle ranges, it is sparsely settled.

The valleys are the principal features, the leading ones being the Surprise, Goose Lake, Hot Springs, Jess, Big, and the Little Hot Springs.

Wheat, barley, apples, vegetables, and hay are the leading staples. Thousands of acres are in alfalfa, and the stock and dairying industries are thriving. Snow falls in the valleys and much deeper in the mountains, forming the principal supply of moisture for the development of the country. Stock is usually fed for several months through the winter, although it is not always necessary to do so.

The county is well watered. Surprise Valley has nearly twenty streams, which run both winter and summer. Goose Lake Valley is equally fortunate, which Pit River supplies with water for many farms and ranches. Many springs exist, especially in the mountains, and in Surprise Valley there are many artesian wells.

The timber of the county is pine and fir in the Warner Range, and sugar pine in the western part.

Horticulture has had but a small place in the industries, only sufficient fruit for home uses being raised. The wild plum is about the only native fruit.

MODOC COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	5
3 to 9 acres	18
10 to 19 acres	13
20 to 49 acres	21
50 to 99 acres	44
100 to 174 acres	229
175 to 259 acres	68
260 to 499 acres	171
500 to 999 acres	92
1,000 acres and over	75
Total	736
Total in 1900	638

Land and Farm Areas.

Approximate land, acres	2,446,720
Land in farms in 1910	410,134
Land in farms in 1900	298,755
Improved land in farms in 1910	164,784
Improved land in farms in 1900	122,647
Woodland in farms	75,668
Other unimproved land	169,682

Value of all Farm Property.

Total value in 1910	$11,376,263
Total value in 1900	5,363,827
Per cent increase 1900-1910	112.1
Land in 1910	7,379,085
Land in 1900	2,825,360
Buildings in 1910	1,004,180
Buildings in 1900	521,900
Implements and machinery in 1910	365,550
Implements and machinery in 1900	174,200
Domestic animals, poultry, and bees in 1910	2,627,448
Domestic animals, poultry, and bees in 1900	1,842,367

MODOC COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,903
Other cows	18,502
Yearling heifers	6,937
Calves	4,608
Yearling steers and bulls	6,517
Other steers and bulls	7,449
Total	46,916
Value	$1,005,026
Horses*—	
Mature horses	12,247
Yearling colts	2,212
Spring colts	976
Total	15,636
Value	*$1,145,568
Mules—	
Mature mules	565
Yearling colts	441
Spring colts	126
Total	1,132
Value	$93,005
Asses and burros—	
Number	98
Value	$26,511
Swine—	
Mature hogs	5,328
Spring pigs	3,160
Total	8,488
Value	$53,595
Sheep—	
Rams, ewes, and wethers	46,078
Spring lambs	30,484
Total	76,562
Value	$286,882
Goats—	
Number	549
Value	$2,331
Total value all domestic animals	$2,612,918
Poultry and bees—	
Poultry of all kinds	23,789
Value	$11,466
Colonies of bees	839
Value	$3,061

Principal Crops.

	Acres	Bushels
Corn	6	209
Oats	728	22,138
Wheat	9,362	195,924
Barley	8,650	227,473
Dry edible beans	88	1,567
Potatoes	346	44,614
Hay and forage—	Acres	Tons
Timothy alone	1,512	3,662
Timothy and clover mixed	5,754	10,195
Alfalfa	10,869	24,480
Other tame and cultivated grasses	3,227	5,373
Wild, salt, or prairie grasses	50,579	70,143
Grains cut green	3,496	4,992
All other hay and forage	42	61
Totals	75,479	118,906

Poultry products—	
Poultry raised, number	38,112
Eggs produced, dozen	134,731
Value poultry and eggs produced	$48,337
Honey and wax—	
Honey produced, pounds	19,796
Wax produced, pounds	232
Value of honey and wax produced	$2,055
Wool—	
Wool, fleeces shorn	39,538
Mohair and goat hair, fleeces shorn	1,356
Value wool and mohair produced	$55,583
Special crops—	
Potatoes, acres	346
All other vegetables, acres	549
Sugar beets, acres	9
Orchard fruits—	Number bearing trees
Apples	28,969
Apricots	652
Cherries	963
Peaches and nectarines	2,113
Pears	1,888
Prunes and plums	3,182
Total	37,776
Grapevines—	
Number in bearing	795
Small fruits—	
Strawberries, acres	9
Blackberries and dewberries, acres	9
All others, acres	19
Total	37
Nuts—	Number bearing trees
Walnuts	3

Irrigation.

Number of farms irrigated in 1909	437
Acres irrigated in 1909	82,075
Acreage enterprises were capable of irrigating in 1910	89,476
Acreage included in projects	124,166
Main ditches, number	446
Length, miles	637
Laterals, number	490
Length, miles	175
Flowing wells, number	45
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$301,040
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$3.36

Mineral Production in 1914.

	Amount	Value
Gold	-----	$1,000
Salt, tons	40	720
Silver	-----	10
Total		$1,730
Number of mineral springs		18

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*Includes animals, age and sex not specified.

MONO COUNTY.

Date of creation, April 24, 1861.

		1890	1900	1910
Land area, 3,030 square miles.	Population-----	2,002	2,167	2,042
County seat, Bridgeport, township.	Population-----	335	373	312
Population per square mile, 0.7.				

	Highest	Lowest		Inches		Inches
Elevation, 6,500 feet. 1915: Temperature---	90	—20	Rainfall---	9.57	Snow--	79.3

Mono is a long, narrow county lying on the eastern slope of the Sierra, its greatest length bordering on the state of Nevada, which forms its northeastern boundary, its general direction being northeast and northwest.

The general contour is mountainous and very rough, all but 400 square miles, or less, being mountainous. The western portion lies among the Sierra Nevada Mountains, along their summit, the heights being clad in snow, and the slopes of the range being covered with forest trees.

Among the highest peaks are Mount Dana, 13,627 feet; Mount Lyell, 13,217 feet, and Castle Pass, 13,000 feet. The greater portion of the population is in the eastern part, in the valleys and the mining camps in the surrounding mountains. This portion, which has always been considered a strange, mysterious country, is of a desert-like, volcanic character, abounding in salt pools, alkali, and volcanic table-lands.

Mono Lake, the "Dead Sea of America," is one of the attractions, and is situated in the center of the county; it is about 12 miles long and 8 miles wide; its waters are somewhat unusually compound, various chemical substances being found in solution in them. The lake has a number of small streams flowing into it, but is without perceptible outlet.

Owens River in the south, which takes its rise in a high peak in the Sierra, and Kitten and Walker rivers in the north, are the principal streams. One passes through the southern part into Inyo County. The other, after rising in Mono County, continues its course into the state of Nevada. These two streams with their branches, together with the small streams that flow into Mono Lake, furnish the principal water supply for irrigation.

Grazing is the leading industry, and the pasturage is good and plentiful. Herds of dairy cattle are moved from the valleys during the summer. Large bands of sheep are also driven to its mountains for summer pasturage.

The timber belt is very large and the product of good marketable quality, but as there is no means of transportation, the development of the lumber interests is retarded, although considerable quantities are used for local mining purposes.

Mining for gold is carried on, the leading camp being Bodie.

MONO COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	3
10 to 19 acres	1
20 to 49 acres	1
50 to 99 acres	4
100 to 174 acres	27
175 to 259 acres	12
260 to 499 acres	16
500 to 999 acres	10
1,000 acres and over	17
Total	91
Total in 1900	112

Land and Farm Areas.

Approximate land, acres	1,939,200
Land in farms in 1910	115,672
Land in farms in 1900	186,063
Improved land in farms in 1910	43,382
Improved land in farms in 1900	65,238
Woodland in farms	8,303
Other unimproved land	63,987

Value of all Farm Property.

Total value in 1910	$2,317,797
Total value in 1900	1,175,743
Per cent increase 1900-1910	99.7
Land in 1910	1,587,813
Land in 1900	519,040
Buildings in 1910	154,700
Buildings in 1900	87,380
Implements and machinery in 1910	45,345
Implements and machinery in 1900	26,340
Domestic animals, poultry, and bees in 1910	559,939
Domestic animals, poultry, and bees in 1900	542,983

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	450
Other cows	2,270
Yearling heifers	803
Calves	666
Yearling steers and bulls	685
Other steers and bulls	427
Total	5,301
Value	$107,941
Horses—	
Mature horses	1,655
Yearling colts	310
Spring colts	132
Total	2,097
Value	$175,884
Mules—	
Mature mules	73
Yearling colts	46
Spring colts	17
Total	136
Value	$11,535
Asses and burros—	
Number	62
Value	$1,630
Swine—	
Mature hogs	179
Spring pigs	244
Total	423
Value	$2,766
Sheep—	
Rams, ewes, and wethers	40,805
Spring lambs	22,241
Total	63,046
Value	$256,477
Goats—	
Number	25
Value	$77
Total value all domestic animals	$556,310
Poultry and bees—	
Poultry of all kinds	2,515
Value	$1,584
Colonies of bees	438
Value	$2,045

Principal Crops.

	Acres	Bushels
Corn	4	160
Oats	42	3,000
Wheat	167	2,739
Dry edible beans	5	133
Potatoes	97	12,094

Hay and forage—	Acres	Tons
Timothy and clover mixed	2,278	2,720
Clover alone	4	10
Alfalfa	2,086	6,685
Other tame and cultivated grasses	70	97
Wild, salt, or prairie grasses	2,494	2,576
All other hay and forage	15	30
Totals	6,947	12,118

Poultry products—	
Poultry raised, number	2,559
Eggs produced, dozen	4,541
Value poultry and eggs produced	$2,988
Honey and wax—	
Honey produced, pounds	20,355
Wax produced, pounds	425
Value honey and wax produced	$2,049
Wool—	
Wool, fleeces shorn	29,160
Value wool and mohair produced	$41,209
Special crops—	
Potatoes, acres	97
All other vegetables, acres	36

MONO COUNTY SUMMARY—Continued.

Orchard fruits—	Number bearing trees
Apples	1,088
Apricots	6
Cherries	197
Peaches and nectarines	91
Pears	123
Prunes and plums	86
Total	1,595

Grapevines—	
Number in bearing	2,000
Small fruits, acres	1

Irrigation.

Number of farms irrigated in 1909	76
Acres irrigated in 1909	49,027
Acreage enterprises were capable of irrigating in 1910	50,007
Acreage included in projects	84,973
Main ditches, number	85
Length, miles	172
Laterals, number	101
Length, miles	65
Cost of irrigation enterprises up to July 1, 1910	$64,282
Average cost per acre irrigation enterprises were capable of irrigating in 1910	1.29

Mineral Production in 1914.

	Amount	Value
Gold	-----	$7,000
*Salt, ton	½	150
Silver	-----	10,000
Total		$17,150
Number of mineral springs		20

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*Medicinal.

MONTEREY COUNTY.

Date of creation, February 18, 1850.

Land area, 3,330 square miles.
County seat, Salinas, city.
Population per square mile, 7.3.

	1890	1900	1910
Population-----	18,637	19,380	24,146
Population-----	2,339	3,304	3,736

	Temperature Highest	Lowest	Rainfall Inches	Snow Inches
Elevation, 15 feet. 1915:	*	28	24.17	0

Monterey County is situated about 100 miles south of San Francisco and 300 miles north of Los Angeles, on the Pacific Ocean. It is 124 miles long and 45 miles wide, its extreme length being from north to south.

The county is divided into three sections—the mountains and hills on the east, mountains and hills on the west, and the great Salinas Valley situated between these ranges of mountains.

The portion of Pajaro Valley lying south of the Pajaro River and running to Monterey Bay on the southwest is in Monterey County, and is about 15 miles long and from 6 to 8 miles wide. The land is exceedingly fertile and under a thorough system of cultivation, producing large crops of all kinds of vegetables, grain, fruit, and berries.

There is a considerable acreage in sugar beets, and the largest sugar factory in the State is situated near Salinas City, having a daily slicing capacity of 3,000 tons.

Going south, barley excels, and prunes, apricots, cherries, and almonds grow to perfection in the foothills, canyons, and small valleys.

Currants, gooseberries, blackberries, loganberries and raspberries grow well. Strawberries are in the market most of the year, and are shipped from Pajaro by carloads.

Dairying is very important, if not a leading industry. Some of the finest dairies in the State are in Monterey County, and some of the best cheese and butter in the State are made here.

In the harbor of Monterey Bay the largest battleships of our navy find anchorage within 100 feet of the shore. The fishing industry is an important one, especially for sardines. The two packing houses at Monterey packed 7,500,000 pounds of these fish in 1914. More than two thirds of the abalone catch of the State also comes from this bay.

*Records incomplete.

MONTEREY COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	11
3 to 9 acres	69
10 to 19 acres	71
20 to 49 acres	182
50 to 99 acres	185
100 to 174 acres	263
175 to 259 acres	127
260 to 499 acres	282
500 to 999 acres	225
1,000 acres and over	243
Total	1,658
Total in 1900	1,850

Land and Farm Areas.

Approximate land, acres	2,131,200
Land in farms in 1910	1,147,416
Land in farms in 1900	1,087,032
Improved land in farms in 1910	371,509
Improved land in farms in 1900	373,605
Woodland in farms	140,377
Other improved land	635,530

Value of all Farm Property.

Total value in 1910	$35,021,930
Total value in 1900	19,409,742
Per cent increase 1900-1910	80.4
Land in 1910	27,885,000
Land in 1900	15,632,700
Buildings in 1910	2,178,728
Buildings in 1900	1,353,700
Implements and machinery in 1910	811,886
Implements and machinery in 1900	502,400
Domestic animals, poultry, and bees in 1910	4,146,316
Domestic animals, poultry, and bees in 1900	1,920,942

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	14,066
Other cows	27,626
Yearling heifers	11,046
Calves	13,806
Yearling steers and bulls	7,502
Other steers and bulls	13,133
Total	88,889
Value	$2,079,939
Horses*—	
Mature horses	14,172
Yearling colts	1,993
Spring colts	1,268
Total	17,444
Value	*$1,676,690
Mules—	
Mature mules	546
Yearling colts	66
Spring colts	30
Total	642
Value	$85,550
Asses and burros—	
Number	26
Value	$5,256
Swine—	
Mature hogs	12,567
Spring pigs	7,464
Total	20,031
Value	$119,455
Sheep—	
Rams, ewes, and wethers	17,029
Spring lambs	11,845
Total	28,874
Value	$91,991
Goats—	
Number	3,983
Value	$10,976
Total value all domestic animals	$4,069,857
Poultry and bees—	
Poultry of all kinds	128,325
Value	$63,260
Colonies of bees	3,669
Value	$13,199

Principal Crops.

	Acres	Bushels
Corn	845	15,552
Oats	8,731	240,760
Wheat	22,924	298,080
Barley	98,923	2,026,334
Kafir corn and milo maize	2	40
Dry edible beans	1,504	29,532
Potatoes	5,393	364,468

Hay and forage—	Acres	Tons
Clover alone	60	90
Alfalfa	2,819	8,251
Other tame and cultivated grasses	610	1,215
Wild, salt, or prairie grasses	6,211	5,582
Grains cut green	73,492	93,147
All other hay and forage	455	1,563
Totals	83,647	109,848

Poultry products—	
Poultry raised, number	123,743
Eggs produced, dozen	751,177
Value of poultry and eggs produced	$231,683
Honey and wax—	
Honey produced, pounds	177,279
Wax produced, pounds	2,619
Value of honey and wax produced	$14,708
Wool—	
Wool, fleeces shorn	24,884
Mohair and goat hair, fleeces shorn	3,000
Value wool and mohair produced	$26,549
Special crops—	
Potatoes, acres	5,393
All other vegetables, acres	658
Sugar beets, acres	9,900

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*Includes animals, age and sex not specified.

MONTEREY COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	290,404
Apricots	27,996
Cherries	1,729
Peaches and nectarines	7,381
Pears	5,194
Prunes and plums	6,189
Total	339,105

Tropical fruits—	Number bearing trees
Figs	217
Lemons	7
Oranges	29
Olives	657
Total	913

Grapevines—	
Number in bearing	79,935

Small fruits—	
Strawberries, acres	263
Blackberries and dewberries, acres	56
All others, acres	88
Total	407

Nuts—	Number bearing trees
Almonds	2,196
Pecans	3
Walnuts	306
Total	2,505

Irrigation.

Number of farms irrigated in 1909	258
Acres irrigated in 1909	15,056
Acreage enterprises were capable of irrigating in 1910	27,176
Acreage included in projects	29,914
Main ditches, number	106
Length, miles	223
Laterals, number	23
Length, miles	32
Pumped wells, number	102
Cost of irrigation enterprises up to July 1, 1910	$495,916
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$18.25

Mineral Production in 1914.

	Amount	Value
Coal, tons	5,992	$17,976
Feldspar, tons	700	3,500
Fuller's earth, tons	450	3,150
Gold	-----	4,000
Gypsum, tons	7,000	21,000
Mineral water, gallons	26,000	7,900
Miscellaneous stone	-----	39,202
Sand (glass), tons	9,210	7,633
Silver	-----	20
Other minerals	-----	9,450
Total		$113,831
Number of mineral springs		8

NAPA COUNTY.

Date of creation, February 18, 1850.

Land area, 783 square miles.
County seat, Napa, city.
Population per square mile, 25.3.

	1890	1900	1910
Population	16,411	16,451	19,800
Population	4,395	4,036	5,791

Calistoga (Station):		Temperature Highest	Temperature Lowest	Rainfall Inches	Snow Inches
Elevation 363 feet.	1915:	106	18	53.49	T

The principal resources of Napa County are the raising of grapes, the making of wine and of grape juice; raising of prunes, peaches, pears, plums, and other fruit, and growing of grain. The county is also one of the few producing hops on a commercial scale. The value of mineral products is also considerable. There is a large cement manufactory at Napa Junction.

Napa County has the great advantage of river transportation to the bay of San Francisco, passenger and freight steamers making daily trips between Napa and San Francisco.

No irrigation is required to produce any crops.

Its southern boundary reaches down to within twenty-nine miles of San Francisco. The Napa River, a short tidal stream which drains the great Napa Valley, is navigable to the heart of the city of Napa.

There are many large creeks, brooks, and many springs in the hills, both mineral and otherwise.

(*Information supplied by the Horticultural Commissioner.*)

Since 1910, hundreds of acres of fruit have come into bearing and hundreds of acres have been set out. The plantings are chiefly confined to prunes and pears, which are the chief commercial crops of the county in agriculture. Grapes are the premier crop, there being some 13,000 acres of dry wine grapes in bearing. About two-thirds of the country taxes of the county are said to come out of the vineyards.

Large areas are being cut up and planted to trees, or are being farmed on a more scientific plan—the grain farms, *per se*, becoming a thing of the past. Farmers in certain sections are also reviving their interest in sheep and this is bound to improve the farms where they are kept.

Peach orchards are on the decline, apples about stationary, but good prune land is being rapidly planted up and few first-class prune orchards in full bearing are for sale. A considerable acreage of pears will be planted this year, also.

Dairying is on the increase in the county. The Napa State Hospital has recently completed a 200-cow plant, and about a dozen silos have been installed by different men the past two or three years. A Cow Testing Association is organized for the purpose of improving the herds.

Napa County has no bonded indebtedness.

Napa beef cattle number about 10,000.

Sheep and swine about 20,000.

NAPA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	14
3 to 9 acres	136
10 to 19 acres	223
20 to 49 acres	355
50 to 99 acres	226
100 to 174 acres	223
175 to 259 acres	92
260 to 499 acres	112
500 to 999 acres	84
1,000 acres and over	72
Total	1,537
Total in 1900	1,336

Land and Farm Areas.

Approximate land, acres	501,120
Land in farms in 1910	360,580
Land in farms in 1900	319,327
Improved land in farms in 1910	101,114
Improved land in farms in 1900	111,966
Woodland in farms	193,578
Other unimproved land	65,888

Value of all Farm Property.

Total value in 1910	$18,082,006
Total value in 1900	12,337,046
Per cent increase 1900-1910	46.6
Land in 1910	13,086,656
Land in 1900	8,925,780
Buildings in 1910	3,365,470
Buildings in 1900	2,181,590
Implements and machinery in 1910	500,921
Implements and machinery in 1900	357,980
Domestic animals, poultry, and bees in 1910	1,128,959
Domestic animals, poultry, and bees in 1900	871,696

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	6,270
Other cows	3,945
Yearling heifers	1,403
Calves	2,518
Yearling steers and bulls	758
Other steers and bulls	937
Total	15,866
Value	*$395,721
Horses—	
Mature horses	5,145
Yearling colts	528
Spring colts	237
Total	5,910
Value	$540,055
Mules—	
Mature mules	345
Yearling colts	18
Spring colts	9
Total	372
Value	$37,970
Asses and burros—	
Number	10
Value	$1,315
Swine—	
Mature hogs	5,160
Spring pigs	3,184
Total	8,344
Value	$51,330
Sheep—	
Rams, ewes, and wethers	5,794
Spring lambs	5,084
Total	10,878
Value	$37,076
Goats—	
Number	556
Value	$1,873
Total value all domestic animals	$1,065,340
Poultry and bees—	
Poultry of all kinds	108,777
Value	$61,777
Colonies of bees	524
Value	$1,842

Principal Crops.

	Acres	Bushels
Corn	2,389	59,579
Oats	1,366	32,155
Wheat	4,134	50,671
Barley	3,048	58,300
Kafir corn and milo maize	2	35
Dry edible beans	6	61
Potatoes	530	81,659

Hay and forage—	Acres	Tons
Timothy and clover mixed	10	15
Clover alone	29	55
Alfalfa	1,204	3,423
Other tame and cultivated grasses	496	413
Wild, salt, or prairie grasses	393	627
Grains cut green	23,764	34,503
All other hay and forage	165	295
Totals	26,061	39,331

Poultry products—	
Poultry raised, number	105,428
Eggs produced, dozen	662,159
Value poultry and eggs produced	$218,003
Honey and wax—	
Honey produced, pounds	8,939
Wax produced, pounds	204
Value of honey and wax produced	$942
Wool—	
Wool, fleeces shorn	9,955
Mohair and goat hair, fleeces shorn	153
Value wool and mohair produced	$7,196

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*Includes animals, age and sex not specified.

NAPA COUNTY SUMMARY—Continued.

Special crops—	
Potatoes, acres	530
All other vegetables, acres	428

Orchard fruits—	Number bearing trees
Apples	41,301
Apricots	16,953
Cherries	16,955
Peaches and nectarines	71,080
Pears	50,210
Prunes and plums	299,613
Total	497,391

Tropical fruits—	Number bearing trees
Figs	1,234
Lemons	258
Oranges	1,192
Pomeloes	9
Olives	20,176
Total	23,251

Grapevines—	
Number in bearing	8,595,338
Small fruits—	
Strawberries, acres	22
Blackberries and dewberries, acres	26
All others, acres	11
Total	59

Nuts—	Number bearing trees
Almonds	1,325
Pecans	10
Walnuts	1,105
Total	2,768

Irrigation.

Number of farms irrigated in 1909	36
Acres irrigated in 1909	1,191
Acreage enterprises were capable of irrigating in 1910	2,035
Acreage included in projects	2,443
Main ditches, number	26
Length, miles	8
Laterals, number	3
Length, miles	3
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$53,948
Average cost per acre irrigation enterprises were capable of irrigating in 1910	26.51

Mineral Production in 1914.

	Amount	Value
Mineral water, gallons	142,940	$73,280
Miscellaneous stone	-----	130,316
Quicksilver, flasks	240	11,772
Other minerals	-----	756,380
Total		$971,748
Number of mineral springs		14

NEVADA COUNTY.

Date of creation, April 25, 1851.

Land area, 974 square miles.
County seat, Nevada City.
Population per square mile, 15.4.

	1890	1900	1910
Population	17,369	17,789	14,955
Population	2,524	3,250	2,689

		Highest	Lowest		Inches		Inches
Elevation, 2,850 feet.	1915: Temperature	101	12	Rainfall	60.24	Snow	15.5

Nevada County is situated in that portion of the State generally known as northern California, although its county seat, Nevada City, is but 60 miles from Sacramento. It is bounded on the north by Sierra County, on the east by the state line between California and Nevada, on the south by Placer County, and on the west by Yuba County. From the Yuba County line, Nevada County is hemmed in by the Yuba and Bear rivers until their sources are reached. The South Yuba River heads in the high Sierra and runs across the county almost its entire length from east to west.

On the rolling foothills of the western portion, where snow and frost are seldom seen, the elevation is slightly above the sea level, while along the eastern boundaries rise the snow-capped peaks of the Sierra Nevada to an elevation of nearly 8,000 feet.

In the Chicago Park section, between Colfax and Grass Valley, the soil is particularly adapted to the culture of Bartlett pears, and Hungarian prunes, both of which are grown without irrigation.

In the southwestern portion of the county, where there is an abundance of water, the farmers are turning their attention to dairying.

In the production of gold, Nevada County since 1849 has been a continual producer. Some of the mines are working at a depth of 4,000 feet, and have proven conclusively that in every instance where depth has been attained the ore bodies and the values are equally distributed.

NEVADA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	61
10 to 19 acres	36
20 to 49 acres	77
50 to 99 acres	69
100 to 174 acres	88
175 to 259 acres	53
260 to 499 acres	84
500 to 999 acres	41
1,000 acres and over	28
Total	544
Total in 1900	522

Land and Farm Areas.

Approximate land, acres	623,360
Land in farms in 1910	175,398
Land in farms in 1900	120,743
Improved land in farms in 1910	24,542
Improved land in farms in 1900	24,898
Woodland in farms	48,449
Other unimproved land	102,407

Value of all Farm Property.

Total value in 1910	$3,022,685
Total value in 1900	1,917,540
Per cent increase 1900-1910	55.2
Land in 1910	1,817,417
Land in 1900	1,116,960
Buildings in 1910	664,400
Buildings in 1900	447,640
Implements and machinery in 1910	132,857
Implements and machinery in 1900	102,910
Domestic animals, poultry, and bees in 1910	408,011
Domestic animals, poultry, and bees in 1900	280,030

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,395
Other cows	2,950
Yearling heifers	832
Calves	1,069
Yearling steers and bulls	495
Other steers and bulls	865
Total	8,606
Value	$174,067

NEVADA COUNTY SUMMARY—Continued.

Horses*—	
Mature horses	1,830
Yearling colts	124
Spring colts	70
Total	2,074
Value	*$161,139
Mules—	
Mature mules	57
Yearling colts	11
Total	68
Value	$5,945
Asses and burros—	
Number	10
Value	$205
Swine—	
Mature hogs	1,067
Spring pigs	749
Total	1,816
Value	$12,602
Sheep—	
Rams, ewes, and wethers	6,853
Spring lambs	4,309
Total	11,162
Value	$34,960
Goats—	
Number	2,198
Value	$4,736
Total value all domestic animals	$393,204
Poultry and bees—	
Poultry of all kinds	23,482
Value	$13,731
Colonies of bees	260
Value	$1,076

Principal Crops.

	Acres	Bushels
Corn	5	208
Oats	119	1,559
Wheat	95	1,279
Barley	30	249
Dry edible beans	1	18
Potatoes	106	12,733

Hay and forage—	Acres	Tons
Timothy alone	55	56
Timothy and clover mixed	267	390
Clover alone	221	459
Alfalfa	492	1,114
Other tame and cultivated grasses	887	1,489
Wild, salt, or prairie grasses	1,706	1,685
Grains cut green	5,068	4,191
All other hay and forage	29	113
Totals	8,725	9,497

Poultry products—	
Poultry raised, number	35,776
Eggs produced, dozen	150,596
Value poultry and eggs produced	$63,612
Honey and wax—	
Honey produced, pounds	5,452
Wax produced, pounds	42
Value of honey and wax produced	$779

Wool—	
Wool, fleeces shorn	10,607
Mohair and goat hair, fleeces shorn	1,043
Value wool and mohair produced	$8,382
Special crops—	
Potatoes, acres	106
Sweet potatoes, acres	1
All other vegetables, acres	231
Sugar beets, acres	39

Orchard fruits—	Number bearing trees
Apples	20,223
Apricots	193
Cherries	1,727
Peaches and nectarines	17,873
Pears	36,800
Prunes and plums	6,955
Total	84,259

Tropical fruits—	Number bearing trees
Figs	1,468
Lemons	6
Oranges	364
Pomeloes	2
Olives	419
Total	2,311

Grapevines—	
Number in bearing	94,338
Small fruits—	
Strawberries, acres	4
Blackberries and dewberries, acres	15
All others, acres	36
Total acres	55

Nuts—	Number bearing trees
Almonds	1,325
Pecans	10
Walnuts	1,105
Total	2,768

Irrigation.

Number of farms irrigated in 1909	300
Acres irrigated in 1909	3,839
Acreage enterprises were capable of irrigating in 1910	4,259
Acreage included in projects	5,267
Main ditches, number	110
Length, miles	236
Laterals, number	46
Length, miles	32
Pumped wells, number	5
Cost of irrigation enterprises up to July 1, 1910	$1,569,028
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$368.40

Mineral Production in 1914.

	Amount	Value
Copper, pounds	39	$5
Gems	-----	60
Gold	-----	3,300,000
Lead, pounds	145	6
Miscellaneous stone	-----	2,108
Silver	-----	27,000
Total		$3,329,179
Number of mineral springs		1

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*Includes animals, age and sex not specified.

ORANGE COUNTY.

Date of creation, March 11, 1889.

		1890	1900	1910
Land area, 795 square miles.	Population	13,589	19,696	34,436
County seat, Santa Ana, city.	Population	1,456	3,628	8,429
Population per square mile, 43.3.				

Yorba Linda (Station):		Highest	Lowest		Inches		Inches
Elevation, 405 feet.	1915: Temperature	104	23	Rainfall	14.94	Snow	0

Orange County is bounded on the north by Los Angeles County, on the east by San Bernardino and Riverside counties, on the south by San Diego County, and on the west by the Pacific Ocean. The Santa Ana River enters the county on the northeast boundary and empties into Newport Bay, furnishing irrigating water to the Anaheim Union Water Company and Santa Ana Valley Irrigating Company. The Santiago Creek furnishes water to and along the foothills east of Orange.

San Juan by the Sea, Arch Beach, and Laguna Beach are open coast resorts. Corona del Mar, East Newport, Balboa, Newport Beach, and Port Orange are situated on Newport Bay, which is the best shipping point of the county. The county is one of the largest producers of oranges, of which a large acreage has been planted in recent years. There is also a considerable acreage in olives. The first raisin grapevines in southern California were planted in this county by McPherson Bros. in 1872, and the first raisins produced in 1875, but the vines were killed in 1888 by the Anaheim disease.

The county is one of the largest producers of Lima beans, and also of sugar beets and celery; the acreage in the latter is being reduced, as growers find that beans and sugar beets pay better.

(*Information supplied by the Chamber of Commerce.*)

These estimates are made after a thoroughly careful investigation. For illustration, take oranges: we let the orange shippers of the county make the estimate; for oil and gasoline, we take our county assessor's figures, and there are only one or two of the smaller ones that may be slightly exaggerated; for illustration, bees and honey may be a little large; the tomato seed also may be a few thousand dollars too high, but outside of those, the balance of the statement is authentic. So take it all in all the 1915 figures as given are as nearly correct as is possible for any agency to get them, and we are willing to stand back of the estimate, knowing that an investigation will prove it, and that our total estimate will probably be one million dollars too small.

Important Products for 1915.

Apricots	$185,000	Live stock (all kinds)	850,000
Apples	20,000	Oil (crude)	7,500,000
Avocados (alligator pears)	6,500	Oil (olive)	100,000
Beans (90 per cent limas)	2,100,000	Olives (pickled)	50,000
Bees and honey	50,000	Oranges	4,150,000
Beet sugar (by-products)	1,000,000	Peppers	250,000
Berries (all kinds)	75,000	Poultry and eggs	1,500,000
Butter	25,000	Potatoes (Irish)	650,000
Celery	100,000	Potatoes (sweet)	200,000
Cream	50,000	Sugar (beet)	6,750,000
Fish (salt water)	50,000	Tomatoes	150,000
Fruits (miscellaneous)	300,000	Tomato seed	50,000
Gas (natural for fuel and light)	1,750,000	Vegetables (miscellaneous)	200,000
Gasoline (manufactured from natural gas)	3,000,000	Walnuts	1,600,000
Grain (barley, corn, etc.)	750,000	Wine and beer	200,000
Hay (alfalfa, barley, oat, bean)	1,250,000		
Lemons	800,000	Total	$35,711,500

ORANGE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	28
3 to 9 acres	531
10 to 19 acres	802
20 to 49 acres	1,043
50 to 99 acres	351
100 to 174 acres	175
175 to 259 acres	60
260 to 499 acres	86
500 to 999 acres	52
1,000 acres and over	37
Total	3,165
Total in 1900	2,388

Land and Farm Areas.

Approximate land, acres	508,800
Land in farms in 1910	371,692
Land in farms in 1900*	599,436
Improved land in farms in 1910	189,463
Improved land in farms in 1900	236,847
Woodland in farms	4,476
Other unimproved land	177,753

Value of all Farm Property.

Total value in 1910	$64,357,852
Total value in 1900	22,346,595
Per cent increase 1900-1910	188.0
Land in 1910	55,952,755
Land in 1900	18,533,640
Buildings in 1910	4,660,795
Buildings in 1900	2,177,040
Implements and machinery in 1910	1,148,222
Implements and machinery in 1900	456,500
Domestic animals, poultry, and bees in 1910	2,596,080
Domestic animals, poultry, and bees in 1900	1,179,415

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	6,184
Other cows	4,473
Yearling heifers	2,124
Calves	2,231
Yearling steers and bulls	1,168
Other steers and bulls	2,040
Total	18,220
Value	$506,811
Horses—	
Mature horses	9,580
Yearling colts	760
Spring colts	225
Total	10,565
Value	$1,338,440
Mules—	
Mature mules	2,223
Yearling colts	38
Spring colts	7
Total	2,268
Value	$396,360
Asses and burros—	
Number	25
Value	$1,195
Swine—	
Mature hogs	2,265
Spring pigs	2,183
Total	4,448
Value	$32,959
Sheep—	
Rams, ewes, and wethers	31,802
Spring lambs	11,876
Total	43,678
Value	$176,893
Goats—	
Number	423
Value	$1,220
Total value all domestic animals	$2,453,878
Poultry and bees—	
Poultry of all kinds	186,746
Value	$125,423
Colonies of bees	5,159
Value	$16,779

Principal Crops.

	Acres	Bushels
Corn	3,054	91,643
Oats	995	30,858
Wheat	793	10,797
Barley	27,384	671,526
Kafir corn and milo maize	189	3,557
Dry edible beans	21,186	402,951
Potatoes	1,770	127,367

Hay and forage—	Acres	Tons
Alfalfa	5,304	23,139
Other tame and cultivated grasses	6,128	8,177
Wild, salt, or prairie grasses	65	65
Grains cut green	35,753	53,045
All other hay and forage	401	3,229
Totals	47,651	87,655

Poultry products—	
Poultry raised, number	239,563
Eggs produced, dozen	1,198,290
Value poultry and eggs produced	$414,692
Honey and wax—	
Honey produced, pounds	325,656
Wax produced, pounds	2,764
Value of honey and wax produced	$18,525
Wool—	
Wool, fleeces shorn	62,072
Value of wool and mohair produced	$51,474
Special crops—	
Potatoes, acres	1,770
Sweet potatoes, acres	484
All other vegetables, acres	3,785
Sugar beets, acres	10,275

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*By an error the acreage was reported in 1900 as 599,436, instead of 425,277.

ORANGE COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	11,992
Apricots	129,352
Cherries	23
Peaches and nectarines	12,461
Pears	2,100
Prunes and plums	4,569
Total	160,667

Tropical fruits—	Number bearing trees
Figs	1,066
Lemons	46,954
Oranges	478,272
Pomeloes	677
Olives	67,046
Total	597,383

Grapevines—	
Number in bearing	282,682

Small fruits—	
Strawberries, acres	76
Blackberries and dewberries, acres	43
All others, acres	86
Total	205

Nuts—	Number bearing trees
Almonds	11,539
Pecans	2
Walnuts	535
Total	12,076

Irrigation.

Number of farms irrigated in 1909	2,215
Acres irrigated in 1909	55,056
Acreage enterprises were capable of irrigating in 1910	63,486
Acreage included in projects	71,444
Main ditches, number	309
Length, miles	180
Laterals, number	115
Length, miles	246
Flowing wells, number	588
Pumped wells, number	580
Cost of irrigation enterprises up to July 1, 1910	$1,9 8,246
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$30.69

Mineral Production in 1914.

	Amount	Value
Brick, thousand	1,333	$19,300
Miscellaneous stone	------	88,315
Natural gas, M cubic feet	1,867,336	112,040
Petroleum, barrels	12,758,678	8,612,108
Total		$8,831,763
Number of mineral springs		2

PLACER COUNTY.

Date of creation, April 25, 1851.

		1890	1900	1910
Land area, 1,395 square miles.	Population	15,101	15,786	18,237
County seat, Auburn, city.	Population	1,595	2,050	2,376
Population per square mile, 13.1.				

	Highest	Lowest		Inches		Inches
Elevation, 1,360 feet. 1915: Temperature	103	22	Rainfall	29.52	Snow	0

Placer County is about 100 miles long and of varying widths, from 10 to 30 miles, the course and distance being defined by the course of the rivers which mark its boundaries. It extends from about eight miles from the Sacramento River to the summit of the Sierra Nevada Mountains. Just above Auburn, between the Bear and American rivers, the county is very narrow, being about 8 miles across. Above Auburn it widens out into the two divides lying between the Bear River and the Middle Fork of the American River. These are known as the Dutch Flat, or Railroad Divide, and the Forest Hill Divide. The southwestern portion is more regular in shape than the part just described. This section contains the foothill and level agricultural lands.

The entire extent faces toward the west, extending from an altitude of some 40 feet on the plains in the western portion to over 7,000 feet at its eastern boundary line. At the eastern boundary, separating it from the state of Nevada, is Lake Tahoe, one of the most picturesque lakes in America.

The soil of the western, or valley, portion is of the same general alluvial composition as all the soil in the Sacramento Valley, and is well adapted to the growth of grain. The low foothills near Lincoln are excellent for the grape.

Placer County holds a foremost position among the fruit producers. Peaches have been grown for years, and oranges and olives are also produced. In the production of cherries, small fruits, berries, and table grapes, Placer holds a foremost place.

Dairying and stock and poultry raising are successful industries. Butter making is carried on in the summer, the mountain ranges providing plenty of natural feed for cattle.

Much sugar and yellow pine, fir, spruce, and cedar are found in the mountains, and the lumber output from that section has been very large for many years. Oak and scrub pine abound all over the foothills and fuel is plentiful.

PLACER COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	52
10 to 19 acres	109
20 to 49 acres	289
50 to 99 acres	206
100 to 174 acres	174
175 to 259 acres	69
260 to 499 acres	75
500 to 999 acres	50
1,000 acres and over	36
Total	1,062
Total in 1900	1,076

Land and Farm Areas.

Approximate land, acres	892,800
Land in farms in 1910	248,080
Land in farms in 1900	440,371
Improved land in farms in 1910	98,608
Improved land in farms in 1900	121,063
Woodland in farms	32,194
Other unimproved land	117,278

Value of all Farm Property.

Total value in 1910	$10,234,101
Total value in 1900	6,547,761
Per cent increase 1900-1910	56.3
Land in 1910	7,747,744
Land in 1900	4,839,730
Buildings in 1910	1,399,840
Buildings in 1900	998,620
Implements and machinery in 1910	320,083
Implements and machinery in 1900	222,060
Domestic animals, poultry, and bees in 1910	766,434
Domestic animals, poultry, and bees in 1900	487,351

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	2,[illegible]21
Other cows	2,283
Yearling heifers	602
Calves	1,204
Yearling steers and bulls	428
Other steers and bulls	532
Total	7,510
Value	*$182,827
Horses—	
Mature horses	3,762
Yearling colts	294
Spring colts	137
Total	4,193
Value	$398,692
Mules—	
Mature mules	459
Yearling colts	13
Spring colts	26
Total	498
Value	$58,460
Asses and burros—	
Number	66
Value	$1,529
Swine—	
Mature hogs	1,822
Spring pigs	1,565
Total	3,387
Value	$23,785
Sheep—	
Rams, ewes and wethers	15,142
Spring lambs	9,326
Total	24,468
Value	$68,716
Goats—	
Number	1,512
Value	$3,455
Total value all domestic animals	$737,464
Poultry and bees—	
Poultry of all kinds	43,619
Value	$26,714
Colonies of bees	657
Value	$2,256

Principal Crops.

	Acres	Bushels
Corn	27	1,055
Oats	3,030	40,397
Wheat	5,721	62,167
Barley	1,318	17,128
Kafir corn and milo maize	8	161
Potatoes	72	7,442

Hay and forage—	Acres	Tons
Timothy alone	38	37
Timothy and clover mixed	20	27
Clover alone	78	77
Alfalfa	465	1,249
Other tame and cultivated grasses	218	206
Wild, salt or prairie grasses	1,202	824
Grains cut green	14,009	10,978
All other hay and forage	4	6
Totals	16,034	13,404

Poultry products—	
Poultry raised, number	62,151
Eggs produced, dozen	235,606
Value poultry and eggs produced	$110,974
Honey and wax—	
Honey produced, pounds	7,338
Wax produced, pounds	80
Value honey and wax produced	$814
Wool—	
Wool, fleeces shorn	28,841
Mohair and goat hair, fleeces shorn	177
Value wool and mohair produced	$21,728

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*Includes animals, age and sex not specified.

PLACER COUNTY SUMMARY—Continued.

Special crops—	
Potatoes, acres	72
All other vegetables, acres	408

Orchard fruits—	Number bearing trees
Apples	42,704
Apricots	4,092
Cherries	31,209
Peaches and nectarines	683,821
Pears	112,999
Prunes and plums	279,766
Total	1,190,074

Tropical fruits—	Number bearing trees
Figs	4,463
Lemons	714
Oranges	26,921
Pomeloes	289
Olives	26,396
Total	59,906

Grapevines—	
Number in bearing	1,340,132

Small fruits—	
Strawberries, acres	433
Blackberries and dewberries, acres	62
All others, acres	87
Total	582

Nuts—	Number bearing trees
Almonds	11,539
Pecans	2
Walnuts	535
Total	12,122

Irrigation.

Number of farms irrigated in 1909	618
Acres irrigated in 1909	16,845
Acreage enterprises were capable of irrigating in 1910	23,365
Acreage included in projects	61,751
Main ditches, number	35
Length, miles	194
Laterals, number	46
Length, miles	108
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$2,798,740
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$119.78

Mineral Production in 1914.

	Amount	Value
Brick, thousand	2,000	$10,000
Clay, tons	63,700	49,000
Copper, pounds	453	60
Gold	-----	600,000
Lead, pounds	385	15
Limestone, tons	202,575	202,575
Miscellaneous stone	-----	203,593
Silver	-----	4,500
Total		$1,099,743
Number of mineral springs		12

PLUMAS COUNTY.

Date of creation, March 18, 1854.

		1890	1900	1910
Land area, 2,594 square miles.	Population	4,933	4,657	5,259
County seat, Quincy, township.	Population	818	748	884
Population per square mile, 2.0.				

	Highest	Lowest		Inches		Inches
Elevation, 3,400 feet. 1915: Temperature	98	6	Rainfall	29.13	Snow	47.5

Plumas County is situated in the northeastern part of California. It is bounded on the north by Shasta and Lassen counties, on the south by Yuba, Butte, and Sierra counties, on the east by Lassen, and on the west by Butte and Tehama counties. In the lowest portion the elevation is about 1,800 feet, but sloping gradually from its valleys, it rises gently to an elevation on its mountain ridges of over 7,000 feet. Although a great deal of valley lands have been cultivated, there is still a large acreage of uncleared land.

Plumas County has the largest area of timber land of any county in California. It is practically one entire sweep of forest land from one end to the other. While the greater part of it has been in reserve, the timber on it has been taken up, and the many sawmills throughout its mountains are turning out thousands of feet of white, sugar pine and spruce lumber.

Running in numerous channels through all of its mountain ridges, the ancient river beds afford large stores of gold. There have been millions of dollars in gold taken from the mines of Plumas. There has also been a great deal of surface mining done in times past. The mining section of Plumas is scattered throughout the entire county.

Hot Spring Valley, near the northwest corner of the county, contains scores of rumbling springs from which issue steam, or in which hot mud is bubbling, suggesting nearness to an active volcano. To the southwest of this valley are the geyser and a lake of boiling mud.

PLUMAS COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	6
10 to 19 acres	5
20 to 49 acres	9
50 to 99 acres	12
100 to 174 acres	45
175 to 259 acres	19
260 to 499 acres	37
500 to 999 acres	46
1,000 acres and over	42
Total	221
Total in 1900	267

Land and Farm Areas.

Approximate land, acres	1,660,160
Land in farms in 1910	134,259
Land in farms in 1900	184,449
Improved land in farms in 1910	54,281
Improved land in farms in 1900	57,351
Woodland in farms	27,238
Other unimproved land	52,740

Value of all Farm Property.

Total value in 1910	$3,362,955
Total value in 1900	2,239,876
Per cent increase 1900-1910	50.1
Land in 1910	2,201,654
Land in 1900	1,211,530
Buildings in 1910	532,156
Buildings in 1900	387,010
Implements and machinery in 1910	123,300
Implements and machinery in 1900	97,240
Domestic animals, poultry, and bees in 1910	505,845
Domestic animals, poultry, and bees in 1900	544,096

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,437
Other cows	1,954
Yearling heifers	1,561
Calves	1,586
Yearling steers and bulls	1,468
Other steers and bulls	1,395
Total	11,401
Value	$279,651

PLUMAS COUNTY SUMMARY—Continued.

Horses—	
Mature horses	1,770
Yearling colts	2
Spring colts	68
Total	2,014
Value	$200,409
Mules—	
Mature mules	41
Yearling colts	2
Total	43
Value	$4,435
Asses and burros—	
Number	5
Value	$1,560
Swine—	
Mature hogs	665
Spring pigs	744
Total	1,409
Value	$8,922
Sheep—	
Rams, ewes, and wethers	845
Spring lambs	314
Total	1,159
Value	$4,080
Goats—	
Number	10
Value	$32
Total value all domestic animals	$499,089
Poultry and bees—	
Poultry of all kinds	9,649
Value	$6,272
Colonies of bees	121
Value	$484

Principal Crops.

	Acres	Bushels
Oats	2,193	75,606
Wheat	766	10,313
Barley	1,260	12,216
Potatoes	100	12,638

Hay and forage—	Acres	Tons
Timothy alone	851	1,084
Timothy and clover mixed	5,239	7,191
Clover alone	155	286
Alfalfa	711	1,104
Other tame and cultivated grasses	2,402	2,892
Wild, salt, or prairie grasses	19,794	20,425
Grains cut green	985	1,031
All other hay and forage	15	25
Totals	30,152	34,038

Poultry products—	
Poultry raised, number	15,163
Eggs produced, dozen	48,511
Value of poultry and eggs produced	$22,206
Honey and wax—	
Honey produced, pounds	2,280
Wax produced, pounds	5
Value of honey and wax produced	$308
Wool—	
Wool, fleeces shorn	593
Value of wool and mohair produced	$767
Special crops—	
Potatoes, acres	100
All other vegetables, acres	97

Orchard fruits—	Number bearing trees
Apples	3,534
Apricots	18
Cherries	65
Peaches and nectarines	184
Pears	261
Prunes and plums	510
Total	4,574

Tropical fruits—	Number bearing trees
Figs	6
Olives	6
Total	12

Small fruits—	
Strawberries, acres	6
Blackberries and dewberries, acres	1
All others, acres	6
Total	13

Nuts—	Number bearing trees
Walnuts	4

Irrigation.

Number of farms irrigated in 1909	151
Acres irrigated in 1909	36,602
Acreage enterprises were capable of irrigating in 1910	37,529
Acreage included in projects	37,901
Main ditches, number	147
Length, miles	201
Laterals, number	62
Length, miles	16
Flowing wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$107,118
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$2.85

Mineral Production in 1914.

	Amount	Value
Copper, pounds	150,000	$19,950
Gold	-----	140,000
Lead, pounds	2,058	80
Miscellaneous stone	-----	1,879
Silver	-----	2,900
Total		$164,809
Number of mineral springs		16

RIVERSIDE COUNTY.

Date of creation, March 11, 1893.

		1890	1900	1910
Land area, 7,240 square miles.	Population-----	------	17,897	34,696
County seat, Riverside, city.	Population-----	4,683	7,973	15,212
Population per square mile, 4.8.				

		Highest	Lowest		Inches		Inches
Elevation, 851 feet.	1915: Temperature---	108	27	Rainfall---	15.80	Snow	T

Riverside County was formed in 1893 from the southwestern part of San Bernardino and the northern part of San Diego counties. It is about 200 miles long by 40 miles wide, and embraces most varied geographical and topographical features, climate, scenery, soil, agricultural, horticultural, and mineral resources. It contains within its borders one of the highest mountains in southern California and part of Salton Sea, 250 feet below sea level.

The principal rivers of the county are the Colorado, which forms its eastern boundary; the Santa Ana, having its head in the San Bernardino range of mountains, flowing through the northwestern part of the county, furnishing irrigation for a large area of land; the San Jacinto, having its source in the San Jacinto range, flowing through the San Jacinto, Hemet, and Perris valleys, and forming Lake Elsinore.

The progress of the county has been practically confined to its northwest corner, which embraces one of the largest orange-growing districts in the State. It is supplied by one of the best and most complete irrigating ssytems in the State. The entire western portion is being brought under cultivation from the rapid development of artesian wells. There is also a large acreage in lemons. A factory has recently been established at Riverside for the manufacture of orange juice, which has proved entirely successful. The capacity of the plant will be 4,000 pounds of culls per day, producing approximately 2,000 pint bottles of orange syrup.

During the last fifteen years dates have been grown in an experimental way, but the industry is now well established. In the Coachella Valley and the country around Palo Verde they are being extensively cultivated, but the expense is greater than for other orchard crops, owing to the cost of the offshoots. There are about 5,000 palms shortly coming into bearing. The quantity of edible dates sold last year was about 7,000 pounds.

The central and greater part of the eastern portion of the county is desert, but known to be heavily mineralized. The high cost of freight, fuel, and scarcity of water, making prospecting dangerous, all combine to retard mining developments.

The San Jacinto and Hemet valleys, situated about 45 miles southeast of Riverside City, at the base of the San Jacinto Mountains, are excellently adapted to diversified farming, and the foothills to stock grazing. The San Jacinto Valley is watered by numerous flowing wells and the Hemet Valley by the great Hemet dam, the largest piece of solid masonry in the West, forming a reservoir filled with pure mountain water.

(*Information supplied by the Chamber of Commerce.*)

Districts where the various fruits are mostly grown:

	Acres
Oranges—	
Riverside District, including Arlington, Highgrove and West Riverside	13,325
Corona	4,228
Hemet	1,080
Lemons—	
Riverside District	2,603
Corona	2,284
Pomeloes—	
Riverside District	226
Corona	60
Avocado—	
Riverside District	36
Almonds—	
Banning	1,118
Elsinore	127
Apples—	
Banning	335
Beaumont	1,928
Yucaipa District	312
Perris	70
Hemet	460
Apricots—	
Banning	879
Beaumont	56
Corona	215
Elsinore	701
Perris	450
Hemet	3,100
San Jacinto	311
Cherries—	
Beaumont	353
Grapes—	
Wineville District	2,400
Olives—	
Banning	10
Beaumont	55
Elsinore	837
Perris	475
Hemet	370
Peaches—	
Banning	472
Beaumont	121
Corona	222
Perris	70
Hemet	1,225
San Jacinto	70
Pears—	
Beaumont	230
Perris	150
Hemet	139
San Jacinto	89
Prunes—	
Banning	518
Walnuts—	
Elsinore	334
Perris	30
Hemet	940
San Jacinto	86

Palo Verde Valley, along the Colorado River, in the eastern end of Riverside County, produced 1,631 bales of cotton this last season. The gross return from the cotton and seed was $60 to $75 a bale, the average being close to $70, so that the crop brought about $115,000 into the valley.

In the Arlington district, which is the Petaluma of southern California, the latest figures show about 50,000 laying hens, producing about 6,000,000 eggs per year. They sell for an average of 28 cents a dozen, which would make $140,000 for the eggs alone. A careful canvass of all the other towns in Riverside County would find as many more as there are in Riverside proper, so that for the whole county the above figures should be doubled.

The Hemet olive crop amounts to 225 tons, and the gross price received will amount to about $80,000. Forty thousand dollars is net. The net price to the grower is from $75 to $200 per ton. About 125 tons of olives will be converted into oil.

In 1915 there were nearly 50,000 colonies of bees in the county. The extracted honey amounted to 405 tons and the comb honey 66 tons, or a total of 471 tons. The average price of the former was 5 cents per pound, and of the latter 12 cents a pound. The total amount was 962,000 pounds and the value $57,340. Of this 60 tons or 120,000 pounds was "orange honey."

RIVERSIDE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under acres	42
3 to 9 acres	462
10 to 19 acres	596
20 to 49 acres	614
50 to 99 acres	262
100 to 174 acres	262
175 to 259 acres	99
260 to 499 acres	166
500 to 999 acres	104
1,000 acres and over	81
Total	2,688
Total in 1900	2,340

Land and Farm Areas.

Approximate land, acres	4,633,600
Land in farms in 1910	520,806
Land in farms in 1900	427,097
Improved land in farms in 1910	278,151
Improved land in farms in 1900	216,033
Woodland in farms	30,231
Other unimproved land	212,424

Value of all Farm Property.

Total value in 1910	$46,203,795
Total value in 1900	21,644,031
Per cent increase 1900-1910	113.5
Land in 1910	39,363,652
Land in 1900	18,488,110
Buildings in 1910	3,666,689
Buildings in 1900	1,999,850
Implements and machinery in 1910	1,112,189
Implements and machinery in 1900	399,280
Domestic animals, poultry, and bees in 1910	2,061,265
Domestic animals, poultry, and bees in 1900	756,791

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	5,235
Other cows	4,449
Yearling heifers	2,493
Calves	2,203
Yearling steers and bulls	1,333
Other steers and bulls	3,755
Total	19,468
Value	$484,082
Horses—	
Mature horses	8,969
Yearling colts	943
Spring colts	403
Total	10,315
Value	$1,157,357
Mules—	
Mature mules	1,303
Yearling colts	83
Spring colts	43
Total	1,429
Value	$235,099
Asses and burros—	
Number	88
Value	$9,050
Swine—	
Mature hogs	3,892
Spring pigs	2,258
Total	6,150
Value	$44,770
Sheep—	
Rams, ewes, and wethers	5,589
Spring lambs	1,420
Total	7,009
Value	$30,167
Goats—	
Number	924
Value	$6,712
Total value all domestic animals	$1,937,237
Poultry and bees—	
Poultry of all kinds	84,226
Value	$61,742
Colonies of bees	18,900
Value	$62,286

Principal Crops.

	Acres	Bushels
Corn	372	12,421
Oats	3,767	85,540
Wheat	11,817	159,434
Barley	56,946	958,526
Kafir corn and milo maize	44	580
Dry edible beans	50	192
Potatoes	309	22,392
Hay and forage—	Acres	Tons
Timothy alone	5	5
Alfalfa	12,904	69,230
Other tame and cultivated grasses	795	2,000
Wild, salt, or prairie grasses	14	15
Grains cut green	73,985	69,235
All other hay and forage	727	1,309
Totals	88,430	141,794

Poultry products—	
Poultry raised, number	95,767
Eggs produced, dozen	438,099
Value poultry and eggs produced	$183,490
Honey and wax—	
Honey produced, pounds	902,106
Wax produced, pounds	12,915
Value honey and wax produced	$62,337
Wool—	
Wool, fleeces shorn	4,536
Mohair and goat hair, fleeces shorn	13
Value wool and mohair produced	$2,600
Special crops—	
Potatoes, acres	309
Sweet potatoes, acres	57
All other vegetables, acres	1,225
Sugar beets, acres	4

RIVERSIDE COUNTY SUMMARY—Continued.

Orchard fruits—	Number bearing trees
Apples	10,577
Apricots	83,069
Cherries	982
Peaches and nectarines	72,933
Pears	18,447
Prunes and plums	34,857
Total	220,723

Tropical fruits—	Number bearing trees
Figs	2,054
Lemons	115,020
Oranges	1,021,957
Pomeloes	4,477
Olives	80,572
Total	1,224,217

Grapevines—	
Number in bearing	1,570,749
Small fruits—	
Strawberries, acres	27
Blackberries and dewberries, acres	28
All others, acres	9
Total	64

Nuts—	Number bearing trees
Almonds	21,789
Pecans	98
Walnuts	3,040
Total	24,940

Irrigation.

Number of farms irrigated in 1909	2,174
Acres irrigated in 1909	71,436
Acreage enterprises were capable of irrigating in 1910	103,233
Acreage included in projects	210,452
Main ditches, number	301
Length, miles	500
Laterals, number	262
Length, miles	288
Flowing wells, number	553
Pumped wells, number	792
Cost of irrigation enterprises up to July 1, 1910	$5,648,169
Average cost per acre irrigation enterprises were capable of irrigating in 1910	54.72

Mineral Production in 1914.

	Amount	Value
Brick, thousand	1,610	$36,713
Clay, tons	70,136	69,420
Copper, pounds	36,102	4,802
Gold	-----	10,000
Gypsum, tons	5,300	7,825
Mineral water, gallons	100,000	2,000
Miscellaneous stone	-----	206,802
Silver	-----	100
Other minerals	-----	1,241,924
Total		$1,579,586
Number of mineral springs		23

Manufactures in 1914.

RIVERSIDE.

The population of Riverside at the census of 1910 was 15,212 and it was estimated that it was 18,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase 1909-1914
	1914	1909	
Number of establishments	69	52	----------
Persons engaged in manufactures	1,043	393	165.4
Proprietors and firm members	66	55	----------
Salaried employees	139	75	----------
Wage earners (average number)	838	263	218.6
Primary horsepower	7,952	675	1,078.1
Capital	$6,851,000	$1,084,000	532.0
Services	704,000	259,000	171.8
Salaries	203,000	49,000	314.3
Wages	501,000	210,000	138.6
Materials	1,093,000	523,000	109.0
Value of products	2,307,000	1,013,000	127.7
Value added by manufacture (value of products less cost of materials)	1,214,000	490,000	147.8

SACRAMENTO COUNTY.

Date of creation, February 18, 1850.

Land area, 983 square miles.
County seat, Sacramento, city.
Population per square mile, 69.0.

	1890	1900	1910
Population	40,339	45,915	67,806
Population	26,386	29,282	44,696

Elevation, 71 feet.

1915:	Highest	Lowest		Inches		Inches
Temperature	105	24	Rainfall	17.74	Snow	0

Sacramento County is one of the largest in the Sacramento Valley, as well as one of the oldest in the State, having been organized by the first legislature. Its principal cities and towns are: Sacramento, Folsom, Galt, Elk Grove, Fair Oaks, Courtland, Walnut Grove, Isleton, Franklin, and Cosumnes.

Its area is almost all rich, alluvial plain, ranging from 30 to 125 feet above sea level, rising gradually from the rivers to meet the low, rolling foothills of the Sierra Nevada Mountains.

The Sacramento River is the longest and largest in the State, and is navigable from Red Bluff to San Francisco Bay, giving unexcelled transportation facilities, landing freight on deep water vessels at a minimum cost.

The American River rises in the upper Sierra and enters the county at the northeast corner among the low foothills, flowing in a southwesterly direction, and emptying into the Sacramento just north of the city of Sacramento.

The fish in the rivers are salmon, striped bass, sturgeon, pike, perch, catfish, shad, carp, and black bass.

Strawberries are marketed here eleven months in the year, and fresh vegetables are obtainable the year round. The largest asparagus beds in the State are within the confines of Sacramento County. Alfalfa grows luxuriantly without irrigation on the rich bottom lands.

The river districts are most prolific producers of beans. Egyptian corn, potatoes, asparagus, in fact, all kinds of vegetables thrive, many of them having two growing seasons.

Along the Sacramento, American, and Cosumnes rivers are some of the most productive hop fields in the United States. Hop culture on this coast dates back to 1858. It was early demonstrated that the soil and climate of Sacramento County are unsurpassed for hop culture. For thirty years Sacramento was the largest hop growing county in the State.

Sacramento County presents splendid opportunities to the live stock breeder and the dairyman. There are a number of large creameries in the county and the largest and most modern dairy on the coast is located here. The climate is so temperate and mild that animals remain in the open air practically unsheltered the year round without hardship. The soil, because of its fertility, is peculiarly adapted to the growth of forage crops, especially alfalfa, which is at the same time one of the cheapest of stock feeds.

Hogs are raised generally by the farmers, and pedigreed Poland China, Berkshire, and Essex swine are bred quite extensively and have proven very profitable.

Poultry raising has steadily increased in importance in the last few years. Elk Grove, Galt, and Folsom are among the principal poultry-raising districts.

There are a number of wineries in the county.

One of the largest rock-crushing plants is located in the county, supplying many thousands of tons of crushed rock for the many uses made of it.

SACRAMENTO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	12
3 to 9 acres	167
10 to 19 acres	237
20 to 49 acres	321
50 to 99 acres	170
100 to 174 acres	223
175 to 259 acres	96
260 to 499 acres	173
500 to 999 acres	111
1,000 acres and over	91
Total	1,601
Total in 1900	1,392

Land and Farm Areas.

Approximate land, acres	629,120
Land in farms in 1910	473,044
Land in farms in 1900*	668,426
Improved land in farms in 1910	275,682
Improved land in farms in 1900	327,159
Woodland in farms	20,964
Other unimproved land	176,398

Value of all Farm Property.

Total value in 1910	$36,691,682
Total value in 1900	19,326,626
Per cent increase 1900-1910	89.9
Land in 1910	30,425,404
Land in 1900	15,189,870
Buildings in 1910	3,205,416
Buildings in 1900	2,159,630
Implements and machinery in 1910	786,383
Implements and machinery in 1900	528,780
Domestic animals, poultry, and bees in 1910	2,277,479
Domestic animals, poultry, and bees in 1900	1,448,346

Domestic Animals on Farms and Ranges.

Cattle†—	
Dairy cows	11,979
Other cows	5,481
Yearling heifers	3,195
Calves	5,568
Yearling steers and bulls	1,529
Other steers and bulls	1,961
Total	31,188
Value	†$838,431
Horses—	
Mature horses	8,770
Yearling colts	773
Spring colts	426
Total	9,969
Value	$1,022,335
Mules—	
Mature mules	703
Yearling colts	30
Spring colts	10
Total	743
Value	$87,020
Asses and burros—	
Number	19
Value	$6,245
Swine—	
Mature hogs	6,421
Spring pigs	4,034
Total	10,455
Value	$73,278
Sheep—	
Rams, ewes, and wethers	25,828
Spring lambs	21,129
Total	46,957
Value	$160,221
Goats—	
Number	89
Value	$280
Total value all domestic animals	$2,187,810
Poultry and bees—	
Poultry of all kinds	116,556
Value	$84,188
Colonies of bees	1,835
Value	$5,481

Principal Crops.

	Acres	Bushels
Corn	795	34,089
Oats	4,174	66,949
Wheat	10,704	103,728
Barley	4,599	75,575
Kafir corn and milo maize	2	43
Dry edible beans	7,801	166,872
Potatoes	1,406	160,519

Hay and forage—	Acres	Tons
Timothy alone	1,303	1,187
Clover alone	222	422
Alfalfa	9,602	32,021
Other tame and cultivated grasses	3,714	3,570
Wild, salt, or prairie grasses	1,909	2,196
Grains cut green	40,130	31,040
All other hay and forage	56	112
Totals	56,936	70,548

Poultry products—	
Poultry raised, number	144,701
Eggs produced, dozen	666,906
Value of poultry and eggs produced	$249,821
Honey and wax—	
Honey produced, pounds	55,272
Wax produced, pounds	160
Value of honey and wax produced	$5,393
Wool—	
Wool, fleeces shorn	41,103
Mohair and goat hair, fleeces shorn	7
Value wool and mohair produced	$35,449

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*By an error the acreage in 1900 was reported to be 668,426, instead of 501,448.

†Includes animals, age and sex not specified.

SACRAMENTO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Special crops—	
Potatoes, acres	1,406
All other vegetables, acres	6,367
Sugar beets, acres	7

Orchard fruits—	Number bearing trees
Apples	10,948
Apricots	10,480
Cherries	17,173
Peaches and nectarines	99,635
Pears	161,094
Prunes and plums	206,553
Total	506,961

Tropical fruits—	Number bearing trees
Figs	1,145
Lemons	2,500
Oranges	46,256
Pomeloes	864
Olives	34,077
Total	84,863

Grapevines—	
Number in bearing	7,627,510

Small fruits—	
Strawberries, acres	450
Blackberries and dewberries, acres	52
All others, acres	52
Total	554

Nuts—	Number bearing trees
Almonds	66,372
Pecans	3
Walnuts	755
Total	67,156

Irrigation.

Number of farms irrigated in 1909	1,053
Acres irrigated in 1909	53,683
Acreage enterprises were capable of irrigating in 1910	69,970
Acreage included in projects	74,588
Main ditches, number	213
Length, miles	238
Laterals, number	5
Length, miles	8
Pumped wells, number	1,168
Cost of irrigation enterprises up to July 1, 1910	$1,452,471
Average cost per acre irrigation enterprises were capable of irrigating in 1910	20.76

Mineral Production in 1914.

	Amount	Value
Brick, thousand	22,862	$160,923
Gold	-----	2,175,000
Miscellaneous stone	-----	253,235
Natural gas, cubic feet	80,000	40,000
Silver	-----	3,500
Total		$2,632,658

Manufactures in 1914.

SACRAMENTO.

The population of Sacramento at the census of 1910 was 44,696, and it is estimated that it was 63,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the ciy, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	236	212	11.3
Persons engaged in manufactures	6,148	5,275	16.5
Proprietors and firm members	257	219	17.4
Salaried employees	557	535	4.1
Wage-earners (average number)	5,334	4,521	18.0
Primary horsepower	13,909	8,567	62.4
Capital	$13,593,000	$10,128,000	34.2
Services	4,827,000	4,545,000	6.2
Salaries	664,000	621,000	6.9
Wages	4,163,000	3,924,000	6.1
Materials	9,050,000	6,902,000	31.1
Value of products	16,383,000	14,006,000	17.0
Value added by manufacture (value of products less cost of materials)	7,333,000	7,104,000	3.2

SAN BENITO COUNTY.

Date of creation, February 12, 1874.

		1890	1900	1910
Land area, 1,392 square miles.	Population	6,412	6,633	8,041
County seat, Hollister, town.	Population	1,234	1,315	2,308
Population per square mile, 5.8.				

	Highest	Lowest		Inches		Inches
Elevation, 284 feet. 1915: Temperature	97	22	Rainfall	17.10	Snow	T.

The county extends from northwest to southeast about 60 miles, with a general breadth of 20 miles. The Gabilan Mountains on the southwest constitute the dividing line from Monterey County, and at their base flows northerly, the entire length, the San Benito River. Farther east the Tres Pinos forms another valley.

Irrigation is by gravity from the San Benito River and the Tres Pinos. This is supplemented by an extensive system of pumping from an apparently inexhaustible supply of underground flow, and further by artesian wells in the northern end of the county.

The lime industry, though once large, has ceased, awaiting better transportation facilities. The quicksilver product of the New Idria mines goes on unceasingly. Large deposits of potter's clay of superior quality lie in easy access.

SAN BENITO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	87
10 to 19 acres	83
20 to 49 acres	118
50 to 99 acres	93
100 to 174 acres	107
175 to 259 acres	56
260 to 499 acres	144
500 to 999 acres	109
1,000 acres and over	117
Total	921
Total in 1900	907

Land and Farm Areas.

Approximate land, acres	890,880
Land in farms in 1910	544,301
Land in farms in 1900	512,719
Improved land in farms in 1910	186,573
Improved land in farms in 1900	168,698
Woodland in farms	52,466
Other unimproved land	305,262

Value of all Farm Property.

Total value in 1910	$14,963,867
Total value in 1900	9,117,058
Per cent increase 1900-1910	64.1
Land in 1910	11,272,156
Land in 1900	7,057,190
Buildings in 1910	1,336,855
Buildings in 1900	852,340
Implements and machinery in 1910	391,058
Implements and machinery in 1900	272,030
Domestic animals, poultry and bees in 1910	1,963,798
Domestic animals, poultry and bees in 1900	935,498

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	4,828
Other cows	11,064
Yearling heifers	4,459
Calves	5,864
Yearling steers and bulls	4,151
Other steers and bulls	8,987
Total	39,703
Value	*$939,660
Horses—	
Mature horses	6,921
Yearling colts	955
Spring colts	599
Total	8,475
Value	$843,985
Mules—	
Mature mules	74
Yearling colts	19
Spring colts	3
Total	96
Value	$11,145
Asses and burros—	
Number	29
Value	$945
Swine—	
Mature hogs	5,572
Spring pigs	2,560
Total	8,132
Value	$57,253

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*Includes animals, age and sex not specified.

SAN BENITO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes and wethers	10,635
Spring lambs	4,511
Total	15,146
Value	$55,239
Goats—	
Number	489
Value	$1,159
Total value all domestic animals	$1,909,386
Poultry and bees—	
Poultry of all kinds	95,289
Value	$50,414
Colonies of bees	1,177
Value	$3,998

Principal Crops.

	Acres	Bushels
Corn	401	5,389
Oats	776	13,826
Wheat	4,451	57,535
Barley	10,955	307,215
Dry edible beans	59	677
Potatoes	205	25,438
Totals	16,847	410,080

Hay and forage—	Acres	Tons
Alfalfa	1,940	7,700
Other tame and cultivated grasses	440	630
Wild, salt, or prairie grasses	3,727	3,827
Grains cut green	57,319	70,439
All other hay and forage	638	1,784
Totals	64,064	84,380

Poultry products—	
Poultry raised, number	79,550
Eggs produced, dozen	696,264
Value poultry and eggs produced	$225,891
Honey and wax—	
Honey produced, pounds	68,253
Wax produced, pounds	773
Value honey and wax produced	$5,671
Wool—	
Wool, fleeces shorn	19,457
Mohair and goat hair, fleeces shorn	33
Value wool and mohair produced	$18,974
Special crops—	
Potatoes, acres	205
All other vegetables, acres	183
Sugar beets, acres	283

Orchard fruits—	Number bearing trees
Apples	26,593
Apricots	694
Cherries	3,421
Peaches and nectarines	12,301
Pears	12,409
Prunes and plums	91,066
Total	207,537

Tropical fruits—	Number bearing trees
Figs	128
Lemons	5
Oranges	42
Olives	4
Total	179

Grapevines—	
Number in bearing	177,976
Small fruits—	
Strawberries, acres	35
Blackberries and dewberries, acres	1
All others, acres	18
Total	54

Nuts—	Number bearing trees
Almonds	6,958
Pecans	6
Walnuts	1,369
Total	8,333

Irrigation.

Number of farms irrigated in 1909	240
Acres irrigated in 1909	7,186
Acreage enterprises were capable of irrigating in 1910	13,790
Acreage included in projects	20,067
Main ditches, number	64
Length, miles	61
Laterals, number	12
Length, miles	33
Pumped wells, number	87
Cost of irrigation enterprises up to July 1, 1910	$177,924
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$12.90

Mineral Production in 1914.

	Amount	Value
Mineral water, gallons	700	$280
Miscellaneous stone	-----	110,630
Quicksilver, flasks	6,633	325,349
Total		$436,259
Number of mineral springs		1

SAN BERNARDINO COUNTY.

Date of creation, April 26, 1853.

		1890	1900	1910
Land area, 20,157 square miles.	Population	25,497	27,929	56,706
County seat, San Bernardino, city.	Population	4,012	6,159	12,779
Population per square mile, 2.8.				

	Highest	Lowest		Inches		Inches
Elevation, 1,054 feet. 1915: Temperature	108	27	Rainfall	20.65	Snow	2.0

San Bernardino is not only the largest county in California, but it is the largest in the United States. It is larger than New Hampshire, Vermont, and Rhode Island combined; larger than New Jersey, Delaware, Massachusetts, and Rhode Island combined; very nearly as large as Massachusetts, Connecticut, and New Jersey. There are eight states whose area is less than that of this county.

San Bernardino County is in the southeastern part of the State. The greater portion is desert. In the north is the Mojave desert, and in the east the northern end of the Colorado desert, the arable portion being confined to the southwestern part—the San Bernardino Valley. This valley forms an almost perfect amphitheater, encircled by mountains and hills, open only on the west, allowing the sea breeze from the ocean to sweep its entire length.

Mount San Bernardino, from its distinctive cone, has been adopted by the United States surveyors as the initial point for land surveys in southern California, both base and meridian starting from its peak.

The northern and western portions of the county are almost sterile. Yet, along the Mojave River, where it debouches from the mountains to the desert, and for many miles, the land on both sides is fertile, easily worked, and produces abundantly as long as the water supply is available.

Here was dug the first irrigation ditch in the State, and here were raised the first crops by irrigation. It is over a hundred years since the mission fathers of San Gabriel established a sub-mission, just west of Redlands, and employed Indian labor to dig what is known as the zanja. This ancient ditch is still in use and within the same banks that were first thrown up by Indian labor almost a century ago.

Almost every variety of fruit can be produced in some part of this county. On the lower levels, all the deciduous fruits are produced. The production of oranges, lemons, and pomeloes is large, these fruits being grown to perfection. The production of oranges has increased rapidly during the last few years. There has also been a large increase within the last five years, in alfalfa, and deciduous fruits, but wine grapes are grown to a considerable extent, one of the largest vineyards in the State at Guasti, belonging to the Italian Vineyard Company, contains 3,200 acres of all the best varieties of wine grapes.

In the western part of Rialto, Etiwanda and Cucamonga neighborhoods a considerable quantity of raisins are made.

In the southwest corner of the valley is located the Chino Ranch, on which is one of the largest beet-sugar factories.

There are but few, if any, sheep in the county, the Census Bureau in 1910 reporting only seven, and the assessor's reports since 1910 states that there are none.

Vegetables of nearly all descriptions are raised. The northern and eastern portions are heavily mineralized. The most promising source of potash is in the saline deposits at Searles Lake, where a development plant has been erected, effecting a complete commercial utilization of the vast supply of raw material in sight. The deposits are not only rich in potash but contain, also, borax, common salt, sodium sulphate, and sodium carbonate. The scarcity of water, which renders the life of the prospector precarious, as well as interfering with the working of the mines, and the scarcity and high cost of fuel, all combined, have limited prospecting and retarded mining development, but in spite of these drawbacks the county ranks sixteenth in the State in mineral production, the total value being $1,614,000 in 1914.

SAN BERNARDINO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	76
3 to 9 acres	567
10 to 19 acres	918
20 to 49 acres	703
50 to 99 acres	278
100 to 174 acres	209
175 to 259 acres	70
260 to 499 acres	75
500 to 999 acres	35
1,000 acres and over	18
Total	2,949
Total in 1900	2,350

Land and Farm Areas.

Approximate land, acres	12,900,480
Land in farms in 1910	208,396
Land in farms in 1900	219,132
Improved land in farms in 1910	136,625
Improved land in farms in 1900	96,920
Woodland in farms	23,137
Other unimproved land	48,634

Value of all Farm Property.

Total value in 1910	$68,499,103
Total value in 1900	24,656,402
Per cent increase 1900-1910	177.8
Land in 1910	60,681,348
Land in 1900	21,000,370
Buildings in 1910	5,238,858
Buildings in 1900	2,573,120
Implements and machinery in 1910	1,077,851
Implements and machinery in 1900	395,860
Domestic animals, poultry, and bees in 1910	1,501,046
Domestic animals, poultry, and bees in 1900	687,052

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,043
Other cows	4,389
Yearling heifers	1,075
Calves	926
Yearling steers and bulls	481
Other steers and bulls	2,847
Total	12,761
Value	$335,713
Horses—	
Mature horses	6,339
Yearling colts	372
Spring colts	167
Total	6,878
Value	$899,831
Mules—	
Mature mules	757
Yearling colts	18
Spring colts	3
Total	778
Value	$139,476
Asses and burros—	
Number	83
Value	$1,789
Swine—	
Mature hogs	2,562
Spring pigs	1,187
Total	3,749
Value	$29,173
Sheep—	
Rams, ewes and wethers	7
Value	$35
Goats—	
Number	81
Value	$506
Total value all domestic animals	$1,406,523
Poultry and bees—	
Poultry of all kinds	91,098
Value	$65,160
Colonies of bees	8,073
Value	$29,363

Principal Crops.

	Acres	Bushels
Corn	920	14,839
Oats	436	16,598
Wheat	100	200
Barley	3,260	85,480
Kafir corn and milo maize	1,216	15,391
Potatoes	444	43,364

SAN BERNARDINO COUNTY SUMMARY—Continued.

Hay and forage—	Acres	Tons
Timothy alone	10	15
Clover alone	18	40
Alfalfa	8,263	35,922
Other tame and cultivated grasses	89	146
Wild, salt, or prairie grasses	55	44
Grains cut green	33,764	39,414
All other hay and forage	409	778
Totals	42,608	76,359

Poultry products—	
Poultry raised, number	105,606
Eggs produced, dozen	579,685
Value poultry and eggs produced	$228,998

Honey and wax—	
Honey produced, pounds	363,025
Wax produced, pounds	5,983
Value honey and wax produced	$23,466

Special crops—	
Potatoes, acres	444
Sweet potatoes, acres	55
All other vegetables, acres	813
Sugar beets, acres	4,121

Orchard fruits—	Number bearing trees
Apples	55,150
Apricots	111,125
Cherries	3,057
Peaches and nectarines	197,763
Pears	2,302
Prunes and plums	8,779
Total	379,533

Tropical fruits—	Number bearing trees
Figs	1,144
Lemons	157,731
Oranges	1,951,254
Pomeloes	13,134
Olives	30,190
Total	2,153,501

Grapevines—	
Number in bearing	5,987,127
Small fruits—	
Strawberries, acres	34
Blackberries and dewberries, acres	68
All others, acres	28
Total, acres	130

Nuts—	Number bearing trees
Almonds	634
Walnuts	2,228
Total	2,862

Irrigation.

Number of farms irrigated in 1909	2,463
Acres irrigated in 1909	70,278
Acreage enterprises were capable of irrigating in 1910	86,107
Acreage included in projects	152,415
Main ditches, number	291
Length, miles	466
Laterals, number	237
Length, miles	283
Flowing wells, number	79
Pumped wells, number	449
Cost of irrigation enterprises up to July 1, 1910	$9,416,950
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$109.36

Mineral Production in 1914.

	Amount	Value
Brick, thousand	25	$1,250
Copper, pounds	19,069	2,536
Gold		205,000
Gypsum, tons	17,332	49,150
Lead, pounds	45,110	1,759
Lime, barrels	84,637	93,100
Limestone, tons	23,006	20,880
Mineral paint, tons	80	561
Mineral water, gallons	44,200	5,100
Miscellaneous stone		131,978
Salt, tons	482	2,892
Sand, glass, tons	140	400
Silver		40,000
Other minerals		1,060,000
Total		$1,614,606
Number of mineral springs		44

Manufactures in 1914.

SAN BERNARDINO.

The population of San Bernardino at the census of 1910 was 12,779, and it is estimated that it was 16,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	54	41	----------
Persons engaged in manufactures	1,283	883	45.3
Proprietors and firm members	50	38	----------
Salaried employees	156	116	34.5
Wage earners (average number)	1,077	729	47.7
Primary horsepower	1,715	1,411	21.5
Capital	$1,392,000	$1,242,000	12.1
Services	1,005,000	734,000	36.9
Salaries	180,000	95,000	89.5
Wages	825,000	639,000	29.1
Materials	1,420,000	763,000	86.1
Value of products	2,613,000	1,660,000	57.4
Value added by manufacture (value of products less cost of materials	1,193,000	897,000	33.0

REDLANDS.

The population of Redlands at the census of 1910 was 10,449, and it is estimated that it was 13,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

A comparative summary for the city for 1909 and 1914 follows:

	Census—	
	1914	1909
Number of establishments	28	37
Persons engaged in manufactures	177	260
Proprietors and firm members	25	36
Salaried employees	45	77
Wage-earners (average number)	107	147
Primary horsepower	379	439
Capital	$669,000	$1,104,000
Services	129,000	147,000
Salaries	48,000	47,000
Wages	81,000	100,000
Materials	215,000	239,000
Value of products	522,000	518,000

SAN DIEGO COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 4,221 square miles.	Population	34,897	35,090	61,665
County seat, San Diego, city.	Population	16,159	17,700	39,578
Population per square mile, 14.6.				

		Highest	Lowest		Inches		Inches
Elevation, 87 feet.	1915: Temperature	91	38	Rainfall	13.62	Snow	0

San Diego occupies the extreme southwestern portion of the State, and has an area slightly larger than Massachusetts. The Pacific Ocean washes its shores for upward of 75 miles. The land rises gently from the ocean for a distance of about 50 miles to a chain of peaks forming the backbone of the county, descending again quite rapidly to the Colorado River, the greater part of which is below sea level.

The arable portion of the western slope is divided into a series of irregular terraces or plateaus. The lower, or coast, terrace comprises a number of valleys with the intervening mesa. This large acreage is practically frostless. Next comes a series of higher valleys, varying in elevation from 400 to 500 feet. The third terrace, the altitude of which ranges from 1,000 to 2,500 feet, comprises the foothill region, with numerous smaller intervening valleys, nooks, and glens. Next comes the mountain region. The elevation of the mountain valleys varies from 2,500 to 4,500 feet. They are chiefly devoted to stock raising.

The arable soil of the county may be classed under two heads: granitic and adobe; though there is often a mixture of both, resembling adobe.

San Diego County is coming to the front in the production of Lima beans, some of the most productive sections yielding from 40 to 45 sacks per acre.

The intermountain region, the hills and valleys between the plains of Imperial and the western slope of the county, is rich in minerals, and affords excellent pasturage for several thousand cattle.

The orange, lemon, pomelo, or grapefruit, do well. Raisin grapes are also produced in one or two districts. Olives are grown on a considerable scale in the county. San Diego City has two olive oil factories. Within the last five years apples have increased considerably, peaches and pears have more than doubled, and there has been a large increase in lemons. A limited acreage has recently been planted in avocado trees.

Peaches, apricots, pears, quinces, plums, cherries, and other deciduous fruits do well.

The mineral wealth of San Diego County, though known to be great, is largely undeveloped.

San Diego is producing the finest tourmaline in the United States.

The climate of San Diego is all that could be desired.

SAN DIEGO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	20
3 to 9 acres	236
10 to 19 acres	345
20 to 49 acres	414
50 to 99 acres	269
100 to 174 acres	337
175 to 259 acres	146
260 to 499 acres	246
500 to 999 acres	156
1,000 acres and over	129
Total	2,298
Total in 1900	2,698

Land and Farm Areas.

Approximate land, acres	2,701,440
Land in farms in 1910	834,426
Land in farms in 1900	809,419
Improved land in farms in 1910	234,045
Improved land in farms in 1900	229,791
Woodland in farms	71,020
Other unimproved land	529,361

Value of all Farm Property.

Total value in 1910	$31,124,814
Total value in 1900	18,346,677
Per cent increase 1900-1910	*
Land in 1910	23,934,732
Land in 1900	14,133,990
Buildings in 1910	3,337,382
Buildings in 1900	2,170,190
Implements and machinery in 1910	851,591
Implements and machinery in 1900	533,980
Domestic animals, poultry, and bees in 1910	3,001,109
Domestic animals, poultry, and bees in 1900	1,508,517

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	10,633
Other cows	15,815
Yearling heifers	7,874
Calves	8,088
Yearling steers and bulls	6,490
Other steers and bulls	9,877
Total	58,777
Value	$1,356,802
Horses—	
Mature horses	9,663
Yearling colts	1,130
Spring colts	705
Total	11,498
Value	$1,262,938
Mules—	
Mature mules	683
Yearling colts	60
Spring colts	23
Total	766
Value	$95,570
Asses and burrors—	
Number	181
Value	$11,036
Swine—	
Mature hogs	4,261
Spring pigs	3,130
Total	7,391
Value	$59,842
Sheep—	
Rams, ewes, and wethers	220
Spring lambs	69
Total	289
Value	$1,310
Goats—	
Number	1,147
Value	$2,789
Total value all domestic animals	$2,790,287
Poultry and bees—	
Poultry of all kinds	130,158
Value	$104,829
Colonies of bees	30,566
Value	$105,993

Principal Crops.

	Acres	Bushels
Corn	4,544	71,874
Oats	7,690	177,485
Wheat	7,268	82,012
Barley	17,745	284,677
Kafir corn and milo maize	17	282
Dry edible beans	3,492	45,661
Potatoes	374	35,717

Hay and forage—	Acres	Tons
Timothy alone	26	58
Clover alone	1	5
Alfalfa	2,566	11,739
Other tame and cultivated grasses	6,655	6,225
Wild, salt, or prairie grasses	2,792	2,018
Grains cut green	68,844	60,362
All other hay and forage	1,165	6,152
Totals	82,049	86,559

Poultry products—	
Poultry raised, number	174,778
Eggs produced, dozen	921,117
Value poultry and eggs produced	$357,579
Honey and wax—	
Honey produced, pounds	1,559,607
Wax produced, pounds	18,589
Value of honey and wax produced	$89,401
Wool—	
Wool, fleeces shorn	155
Mohair and goat hair, fleeces shorn	60
Value wool and mohair produced	$195

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*About half of the eastern part of the county, comprising 4,089 square miles, was organized into Imperial County in 1907.

SAN DIEGO COUNTY SUMMARY—Continued.

Special crops—	
Potatoes, acres	[illegible]
Sweet potatoes, acres	27
All other vegetables, acres	1,131
Sugar beets, acres	21

Orchard fruits—	Number bearing trees
Apples	[illegible]
Apricots	[illegible]
Cherries	[illegible]
Peaches and nectarines	[illegible]
Pears	[illegible]
Prunes and plums	16,022
Total	112,993

Tropical fruits—	Number bearing trees
Figs	2,459
Lemons	195,318
Oranges	107,457
Pomelos	5,784
Olives	109,871
Total	[illegible]

Grapevines—	
Number in bearing	1,228,858
Small fruits—	
Strawberries, acres	43
Blackberries and dewberries, acres	22
All others, acres	22
Total	87

Nuts—	Number bearing trees
Almonds	9,279
Pecans	1,080
Walnuts	9,158
Total	19,651

Irrigation.

Number of farms irrigated in 1909	[illegible]
Acres irrigated in 1909	21,944
Acreage enterprises were capable of irrigating in 1910	31,205
Acreage included in projects	45,585
Main ditches, number	296
Length, miles	259
Laterals, number	244
Length miles	140
Pumped wells, number	[illegible]
Cost of irrigation enterprises up to July 1, 1910	$2,752,127
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$130.[illegible]

Mineral Production in 1914.

	Amount	Value
Brick, thousand	5,457	$56,302
Copper, pounds	30	4
Gems	-----	1,510
Mineral water, gallons	8,865	911
Miscellaneous stone	-----	216,250
Salt, tons	15,300	[illegible]
Total		$315,287
Number of mineral springs		[illegible]

Manufactures in 1914.

SAN DIEGO.

The population of San Diego at the census of 1910 was 39,578, and it is estimated that it was 49,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase 1909-1914
	1914	1909	
Number of establishments	257	117	119.6
Persons engaged in manufactures	2,976	1,440	106.7
Proprietors and firm members	244	99	146.5
Salaried employees	672	270	148.9
Wage-earners (average number)	2,060	1,071	92.3
Primary horsepower	6,754	3,269	106.6
Capital	$10,866,000	$5,326,000	104.0
Services	2,237,000	1,069,000	109.3
Salaries	668,000	263,000	154.0
Wages	1,569,000	806,000	94.7
Materials	4,582,000	2,667,000	71.8
Value of products	9,021,000	4,741,000	90.3
Value added by manufacture (value of products less cost of materials)	4,439,000	2,074,000	114.2

SAN FRANCISCO COUNTY.

Date of creation, February 18, 1850.

Land area, 43 square miles.
County seat, San Francisco.
Population per square mile, 9,695.6.

	1890	1900	1910
Population	298,997	342,782	416,912

Elevation, 207 feet.

	Highest	Lowest		Inches		Inches
1915: Temperature	86	36	Rainfall	28.27	Snow	0

San Francisco is essentially a commercial and manufacturing city. It produces no agricultural products, except to a small extent the minor vegetables. Its location on the bay of San Francisco, one of the finest and safest harbors in the world, eminently fits it for a commercial city, and its importance in this respect insures it a place among the chief shipping centers of the world.

The value of all property has increased enormously in recent years in spite of a temporary setback owing to the terrible double disaster of earthquake and fire in 1906, as the following summary of assessed values will prove:

1850	$21,621,184	1911	545,398,908
1860	35,967,499	1912	605,141,664
1870	116,375,988	1913	624,182,130
1880	253,520,326	1914	647,456,025
1890	301,438,040	1915	656,677,332
1900	$410,425,849		

The total county indebtedness in 1915 amounted to $42,635,800. Space will not allow of even a brief summary of the vast resources and possibilities of this great, rising, and progressive city, but much up-to-date information of value will be found in numerous publications, especially in the annual reports of the San Francisco Chamber of Commerce.*

SAN FRANCISCO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	69
3 to 9 acres	50
10 to 19 acres	11
20 to 49 acres	15
50 to 99 acres	7
100 to 174 acres	4
175 to 259 acres	1
Total	157
Total in 1900	304

Land and Farm Areas.

Approximate land, acres	27,520
Land in farms in 1910	2,091
Land in farms in 1900	8,219
Improved land in farms in 1910	1,562
Improved land in farms in 1900	3,829
Woodland in farms	289
Other unimproved land	240

Value of all Farm Property.

Total value in 1910	$2,630,428
Total value in 1900	2,407,893
Per cent increase 1900-1910	9.2
Land in 1910	2,097,111
Land in 1900	1,855,030
Buildings in 1910	326,789
Buildings in 1900	228,100
Implements and machinery in 1910	68,270
Implements and machinery in 1900	71,200
Domestic animals, poultry, and bees in 1910	138,258
Domestic animals, poultry, and bees in 1900	253,563

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	1,645
Other cows	10
Yearling heifers	581
Calves	174
Yearling steers and bulls	75
Other steers and bulls	25
Total	2,510
Value	$77,015

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*For the foreign trade of the port of San Francisco see Part X.

SAN FRANCISCO COUNTY SUMMARY—Continued.

Horses—	
Mature horses	318
Spring colts	1
Total	319
Value	$32,480
Swine—	
Mature hogs	181
Spring pigs	100
Total	281
Value	$1,655
Sheep—	
Rams, ewes, and wethers	3
Value	$20
Goats—	
Number	9
Value	$60
Total value all domestic animals	$111,230
Poultry and bees—	
Poultry of all kinds	42,649
Value	$26,889
Colonies of bees	6
Value	$14

Principal Crops.

	Acres	Bushels
Potatoes	87	7,366

Hay and forage—	Acres	Tons
Alfalfa	1	10
Other tame and cultivated grasses	60	60
Grains cut green	42	80
Totals	103	150

Poultry products—	
Poultry raised, number	196,020
Eggs produced, dozen	110,057
Value poultry and eggs produced	$126,595
Wool—	
Wool, fleeces shorn	3
Value wool and mohair produced	$4
Special crops—	
Potatoes, acres	87
Sweet potatoes, acres	2
All other vegetables, acres	466

Orchard fruits—	Number bearing trees
Apples	40
Peaches and netarines	120
Prunes and plums	945
Total	1,105
Olives—	
Number in bearing	1
Grapevines—	
Number in bearing	3,000

Irrigation.

Number of farms irrigated in 1909	25
Acres irrigated in 1909	383
Acreage enterprises were capable of irrigating in 1910	383
Acreage included in projects	383
Main ditches, number	24
Length, miles	7
Pumped wells, number	39
Cost of irrigation enterprises up to July 1, 1910	$21,975
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$57.38

Mineral Production in 1914.

	Value
Miscellaneous stone	$119,889

SAN JOAQUIN COUNTY.

Date of creation, February 18, 1850.

Land area, 1,448 square miles.
County seat, Stockton, city.
Population per square mile, 35.0.

	1890	1900	1910
Population	28,629	35,452	50,731
Population	14,424	17,506	23,253

		Highest	Lowest		Inches		Inches
Elevation, 23 feet.	1915: Temperature	100	24	Rainfall	17.04	Snow	0

San Joaquin County lies directly east of San Francisco and San Pablo bays and spans the great interior valley of California from the foothills of the Coast Range to the foothills of the Sierra Nevada Mountains. It thus commands the entrance to the chief port and metropolis of the coast from the continent, and for both water and land traffic; hence it is termed the "Gateway County." It embraces most of the famous San Joaquin Delta within its limits. The soil varies in character, but the surface is mostly level and well adapted to intensive agriculture. The climate of this area is tempered by sea influences, by the air which rushes through the gap in the Coast Range.

The county is famous for its good roads, on which large sums have been spent.

(*Information supplied by the Chamber of Commerce.*)

Four hundred miles of navigable waterways, three transcontinental railways, three interurban lines, and three hundred and thirty miles of improved highways give San Joaquin County unusually good transportation facilities and make it possible to capitalize fully its advantageous location, directly east of San Francisco. A developed arm of the San Joaquin River penetrates into the center of its county seat, Stockton. The county is in the heart of the great central valley of California and extends to the rolling land that fronts the Sierra Nevada Mountains. The western third of the county embraces the far-famed San Joaquin Delta, reclaimed by levee construction and drainage, land of exceptional productivity. The soils of the county are roughly divided into peats of the delta, the adobes along the river and surrounding Stockton, the deep, mellow loams of the west side, and the great body of sandy loam found in the northern and southern parts of the county. It is estimated that 40 per cent of the farm area of the county is developed for irrigation by public and private enterprises.

Second in California and twelfth in the United States in the value of all crops, according to census figures, San Joaquin County produces annually about 13½ per cent on its assessed valuation, this ratio being higher than for any other county in the State. The per capita wealth of its rural districts, $2,448.74, is greater than that of any other California county. San Joaquin County is first in the production of cereals, vegetables, potatoes, barley, and table grapes; second in hay and forage, oats and rye; third in grapes; fourth in wheat, beans, peas, and bearing almond trees. It is significant to note that all the crops noted are staples. Animal husbandry is fast coming to the front, opportunities in such lines being especially attractive. Sugar beets and rice are crops that have received a great deal of attention within the last year, conditions for their production having proved eminently satisfactory. From the foregoing it is evident that San Joaquin County has made a record for the diversity as well as for the volume of its crops.

SAN JOAQUIN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	9
3 to 9 acres	204
10 to 19 acres	531
20 to 49 acres	797
50 to 99 acres	397
100 to 174 acres	395
175 to 259 acres	217
260 to 499 acres	371
500 to 999 acres	221
1,000 acres and over	144
Total	3,286
Total in 1900	1,966

Land and Farm Areas.

Approximate land, acres	926,720
Land in farms in 1910	763,048
Land in farms in 1900	751,065
Improved land in farms in 1910	611,762
Improved land in farms in 1900	652,923
Woodland in farms	35,387
Other unimproved land	115,899

Value of all Farm Property.

Total value in 1910	$67,286,628
Total value in 1900	31,218,424
Per cent increase 1900-1910	115.5
Land in 1910	55,909,884
Land in 1900	25,769,500
Buildings in 1910	5,675,665
Buildings in 1900	2,297,130
Implements and machinery in 1910	1,741,053
Implements and machinery in 1900	907,410
Domestic animals, poultry, and bees in 1910	3,930,026
Domestic animals, poultry, and bees in 1900	2,214,294

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	11,904
Other cows	6,861
Yearling heifers	3,636
Calves	4,960
Yearling steers and bulls	1,937
Other steers and bulls	1,998
Total	31,296
Value	$874,834
Horses*—	
Mature horses	18,256
Yearling colts	1,597
Spring colts	1,089
Total	20,972
Value	*$2,247,876
Mules—	
Mature mules	3,169
Yearling colts	217
Spring colts	144
Total	3,530
Value	$482,560
Asses and burros—	
Number	62
Value	$16,760
Swine—	
Mature hogs	13,473
Spring pigs	9,981
Total	23,454
Value	$143,626
Sheep—	
Rams, ewes, and wethers	14,807
Spring lambs	10,012
Total	24,819
Value	$83,771
Goats—	
Number	260
Value	$728
Total value all domestic animals	$3,850,155
Poultry and bees—	
Poultry of all kinds	175,456
Value	$101,710
Colonies of bees	3,014
Value	$8,161

Principal Crops.

	Acres	Bushels
Corn	2,547	57,028
Oats	23,208	396,661
Wheat	24,786	310,587
Barley	125,114	3,827,187
Kafir corn and milo maize	2,968	32,786
Dry edible beans	13,954	352,157
Potatoes	21,313	4,279,395

Hay and forage—	Acres	Tons
Timothy and clover mixed	190	320
Clover alone	70	352
Alfalfa	8,805	36,859
Other tame and cultivated grasses	3,633	3,975
Wild, salt, or prairie grasses	10,248	12,286
Grains cut green	80,851	119,032
All other hay and forage	1,119	1,624
Totals	104,916	174,448

Poultry products—	
Poultry raised, number	212,434
Eggs produced, dozen	955,501
Value poultry and eggs produced	$337,417
Honey and wax—	
Honey produced, pounds	104,6[illegible]5
Wax produced, pounds	3,459
Value of honey and wax produced	$6,565
Wool—	
Wool, fleeces shorn	20,477
Mohair and goat hair, fleeces shorn	37
Value of wool and mohair produced	$14,114
Special crops—	
Potatoes, acres	21,313
Sweet potatoes, acres	19
All other vegetables, acres	6,728
Sugar beets, acres	132

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*Includes animals, age and sex not specified.

SAN JOAQUIN COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	5,053
Apricots	53,007
Cherries	21,590
Peaches and nectarines	185,073
Pears	13,664
Prunes and plums	83,641
Total	364,290

Tropical fruits—	Number bearing trees
Figs	4,037
Lemons	75
Oranges	1,950
Pomeloes	2
Olives	19,998
Total	26,070

Grapevines—	
Number in bearing	13,371,794

Small fruits—	
Strawberries, acres	33
Blackberries and dewberries, acres	31
All others, acres	28
Total	92

Nuts—	Number bearing trees
Almonds	97,024
Pecans	6
Walnuts	2,455
Total	99,499

Irrigation.

Number of farms irrigated in 1909	1,452
Acres irrigated in 1909	59,811
Acreage enterprises were capable of irrigating in 1910	77,083
Acreage included in projects	173,563
Main ditches, number	298
Length, miles	308
Laterals, number	49
Length, miles	192
Pumped wells, number	1,618
Cost of irrigation enterprises up to July 1, 1910	$1,689,720
Average cost per acre irrigation enterprises were capable of irrigating in 1910	21.92

Mineral Production in 1914.

	Amount	Value
Brick, thousand	5,793	$82,890
Manganese, tons	150	1,500
Miscellaneous stone	-----	19,440
Natural gas, thousand cu. ft.	154,872	25,900
Other minerals	-----	200
Total		$129,930

Manufactures in 1914.

STOCKTON.

The population of Stockton at the census of 1910 was 23,253, and it is estimated that it was 26,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that there was a slight decrease in the capital invested, materials, and value of products for 1914 as compared with 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	157	142	10.6
Persons engaged in manufactures	2,605	2,008	29.7
Proprietors and firm members	161	139	15.8
Salaried employees	467	298	56.7
Wage-earners (average number)	1,977	1,571	25.8
Primary horsepower	5,147	4,971	3.5
Capital	$7,762,000	$8,144,000	—4.7
Services	2,192,000	1,657,000	32.3
Salaries	588,000	370,000	58.9
Wages	1,604,000	1,287,000	24.6
Materials	7,432,000	7,997,000	—7.1
Value of products	11,293,000	11,470,000	—1.5

Minus sign (—) denotes decrease.

SAN LUIS OBISPO COUNTY.

Date of creation, February 12, 1850.

Land area, 3,334 square miles.
County seat, San Luis Obispo, city.
Population per square mile, 5.8.

	1890	1900	1910
Population	16,072	16,637	19,383
Population	2,995	3,021	5,157

Elevation, 201 feet. 1915:	Highest	Lowest		Inches		Inches
Temperature	97	29	Rainfall	25.89	Snow	0

This large and fertile county lies on the coast side of the State, about midway between San Francisco and Los Angeles. It is an old county, organized in the days of gold, and received its name nearly a hundred years before the Americans came into the country. It was a great region in the days of the Spanish occupation, and is a great region still in its advantages of soil and climate, of diversified surface and abundant natural resources.

Much grain is still grown. In the eastern portion of the county wheat is still a large product, with an increasing acreage sown to barley.

Fruit is grown successfully in almost all portions of the county, and there are wide areas where fruit of many kinds is a prolific crop. The coast section is especially adapted, nearly every variety doing well.

Paso Robles is the leading town east of the Santa Lucia Mountains, and the second in size in the county, and is pleasantly situated on the Salinas River in a land of oaks and rolling hills. Its chief features are the hot springs. The great hot springs flow approximately 2,000,000 gallons per day, and there are several other springs of varying chemical constituents and adapted to wide medicinal uses.

The producing oil wells of San Luis Obispo County demonstrate the fact that the Monterey shale, found over the greater portion of the coast side of the county, is an extension of those of the great Santa Maria oil fields immediately adjoining the county on the south. Port San Luis, which is the terminus of three pipe lines from the Santa Maria fields, is one of the largest oil ports. The well-known Coalinga, Kern River, Midway, Sunset, and McKittrick fields are also connected by pipe line with this port.

SAN LUIS OBISPO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	65
10 to 19 acres	80
20 to 49 acres	179
50 to 99 acres	187
100 to 174 acres	267
175 to 259 acres	123
260 to 499 acres	304
500 to 999 acres	288
1,000 acres and over	211
Total	1,714
Total in 1900	1,813

Land and Farm Areas.

Approximate land, acres	2,133,760
Land in farms in 1910	1,588,660
Land in farms in 1900	1,034,480
Improved land in farms in 1910	326,928
Improved land in farms in 1900	412,356
Woodland in farms	174,891
Other unimproved land	1,086,841

Value of all Farm Property.

Total value in 1910	$32,426,353
Total value in 1900	14,635,757
Per cent increase 1900-1910	121.6
Land in 1910	24,745,375
Land in 1900	11,133,180
Buildings in 1910	2,136,447
Buildings in 1900	1,272,820
Implements and machinery in 1910	742,498
Implements and machinery in 1900	479,840
Domestic animals, poultry, and bees in 1910	4,802,053
Domestic animals, poultry, and bees in 1900	1,749,917

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	24,193
Other cows	22,903
Yearling heifers	10,345
Calves	15,635
Yearling steers and bulls	8,948
Other steers and bulls	33,180
Total	118,704
Value	*$2,789,415

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*Includes animals, age and sex not specified.

SAN LUIS OBISPO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	12,601
Yearling colts	1,683
Spring colts	987
Total	15,274
Value	$1,451,083
Mules—	
Mature mules	754
Yearling colts	83
Spring colts	40
Total	877
Value	$108,795
Asses and burros—	
Number	19
Value	$2,095
Swine—	
Mature hogs	11,750
Spring pigs	6,118
Total	17,868
Value	$110,380
Sheep—	
Rams, ewes, and wethers	54,717
Spring lambs	32,236
Total	86,953
Value	$256,156
Goats—	
Number	7,390
Value	$14,783
Total value all domestic animals	$4,733,160
Poultry and bees—	
Poultry of all kinds	119,822
Value	$53,605
Colonies of bees	3,933
Value	$15,268

Principal Crops.

	Acres	Bushels
Corn	1,509	21,015
Oats	1,139	35,884
Wheat	33,608	428,636
Barley	25,370	667,718
Kafir corn and milo maize	1	24
Dry edible beans	11,169	207,674
Potatoes	955	105,277
Hay and forage—	Acres	Tons
Alfalfa	939	2,658
Other tame and cultivated grasses	1,888	2,103
Wild, salt, or prairie grasses	830	1,038
Grains cut green	50,951	62,650
All other hay and forage	330	1,776
Total	55,000	70,225

Poultry products—	
Poultry raised, number	109,871
Eggs produced, dozens	840,405
Value of poultry and eggs produced	$243,214
Honey and wax—	
Honey produced, pounds	177,342
Wax produced, pounds	1,983
Value of honey and wax produced	$11,374
Wool—	
Wool, fleeces shorn	64,719
Mohair and goat hair, fleeces shorn	4,758
Value of wool and mohair produced	$52,868
Special crops—	
Potatoes, acres	955
Sweet potatoes, acres	3
All other vegetables, acres	950
Sugar beets, acres	281

Orchard fruits—	Number bearing trees
Apples	35,006
Apricots	20,123
Cherries	702
Peaches and nectarines	10,614
Pears	5,097
Prunes and plums	21,383
Total	93,217

Tropical fruits—	Number bearing trees
Figs	819
Lemons	955
Oranges	794
Pomeloes	75
Olives	1,597
Total	4,253

Grapevines—	
Number in bearing	265,481
Small fruits—	
Strawberries, acres	45
Blackberries and dewberries, acres	30
All others, acres	62
Total	137

Nuts—	Number bearing trees
Almonds	9,281
Pecans	1
Walnuts	7,871
Total	17,264

Irrigation.

Number of farms irrigated in 1909	91
Acres irrigated in 1909	1,687
Acreage enterprises were capable of irrigating in 1910	2,416
Acreage included in projects	2,539
Main ditches, number	51
Length, miles	42
Laterals, number	5
Length, miles	3
Flowing wells, number	4
Pumped wells, number	12
Cost of irrigation enterprises up to July 1, 1910	$32,311
Average cost per acre irrigation enterprises were capable of irrigating in 1910	13.37

Mineral Production in 1914.

	Amount	Value
Bituminous rock, tons	579	$1,118
Mineral water, gallons	1,000	250
Quicksilver, flasks	1,266	62,097
Total		$63,465
Number of mineral springs		12

SAN MATEO COUNTY.

Date of creation, April 19, 1856.

		1890	1900	1910
Land area, 447 square miles.	Population	10,087	12,094	26,585
County seat, Redwood, city.	Population	1,572	1,653	2,442
Population per square mile, 59.5.				

San Mateo (Station):		Highest	Lowest		Inches		Inches
Elevation, 22 feet.	1915: Temperature	90	32	Rainfall	27.30	Snow	0

San Mateo County is that part of the San Francisco peninsula lying between San Francisco County on the north and Santa Clara and Santa Cruz counties on the south. This county is divided lengthwise by the Santa Morena ridge of mountains, forming the backbone of the peninsula. The mountain ridge is the fertile and picturesque watershed of a region peculiarly adapted for homes of beauty and comfort on its eastern slope. Along the bay shore are many miles of deep water, and spur tracks to this deep water are now under construction, thereby opening up vast possibilities to manufacturers who desire cheap sites with excellent shipping facilities.

On the west the descent to the Pacific is quick and abrupt into a region occupied by farmers, dairymen, stock raisers, and lumbermen. The whole ridge is anywhere accessible, and all more or less covered with oak and redwood.

Climatic and scenic surroundings, shipping facilities, proximity to the metropolis of the Pacific Coast, are all favorable conditions working toward the prosperity of this county.

(*Information supplied by the Chamber of Commerce.*)

San Mateo County is the home of the artichoke and brussels sprouts, the rolling hill country of its western shore showing thousands of acres under cultivation for these vegetables, the market for which extends from the Pacific to the Atlantic. All sorts of vegetables thrive in San Mateo County, the northern end seemingly being particularly adapted for their cultivation. The cultivation of flowers, both in the open and under glass, finds in the climatic conditions found in San Mateo County an aid which has resulted in the development of a large and profitable industry. Seventy-five per cent of the flowers sold in San Francisco's world-famed street marts are produced in San Mateo County. The violet beds of San Mateo, some of which are acres in extent, have long been a lure for tourists.

On the east shore or bay side of San Mateo County deep water has brought the county an extensive industrial development, particularly at South San Francisco and Redwood City, where harbors and manufacturing centers have been developed, some of the largest plants on the coast being located at these points.

The wondrous scenic attractions of the county have been capitalized by the people through the expenditure of nearly one and one-half million dollars in the construction of a magnificent highway system radiating from El Camino Real, the state highway, which passes through the county and joins the paved streets of San Francisco at the county line. The construction of these roads has brought an unprecedented growth to the county, evidenced by the beautiful homes built and now under course of construction in what were formerly inaccessible spots.

Climatic and scenic surroundings, road, rail and shipping facilities, proximity to the metropolis of the Pacific Coast, are all favorable conditions working toward the prosperity of the county.

SAN MATEO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	46
3 to 9 acres	81
10 to 19 acres	55
20 to 49 acres	112
50 to 99 acres	61
100 to 174 acres	90
175 to 259 acres	52
260 to 499 acres	67
500 to 999 acres	60
1,000 acres and over	41
Total	665
Total in 1900	551

Land and Farm Areas.

Approximate land, acres	286,080
Land in farms in 1910	160,655
Land in farms in 1900	149,944
Improved land in farms in 1910	100,800
Improved land in farms in 1900	72,429
Woodland in farms	27,334
Other unimproved land	32,521

Value of all Farm Property.

Total value in 1910	$20,870,585
Total value in 1900	10,354,856
Per cent increase 1900-1910	101.6
Land in 1910	17,448,280
Land in 1900	8,201,140
Buildings in 1910	2,006,705
Buildings in 1900	1,333,390
Implements and machinery in 1910	398,327
Implements and machinery in 1900	173,600
Domestic animals, poultry, and bees in 1910	1,017,273
Domestic animals, poultry, and bees in 1900	646,726

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	8,119
Other cows	2,305
Yearling heifers	1,848
Calves	2,375
Yearling steers and bulls	369
Other steers and bulls	272
Total	15,288
Value	$763,646
Horses—	
Mature horses	3,940
Yearling colts	253
Spring colts	102
Total	4,295
Value	$125,976
Mules—	
Mature mules	10
Yearling colts	2
Total	12
Value	$915
Asses and burros—	
Number	2
Value	$50
Swine—	
Mature hogs	8,692
Spring pigs	3,990
Total	12,682
Value	$93,912
Sheep—	
Rams, ewes, and wethers	767
Spring lambs	562
Total	1,329
Value	$5,140
Goats—	
Number	154
Value	$569
Total value all domestic animals	$990,208
Poultry and bees—	
Poultry of all kinds	47,625
Value	$26,112
Colonies of bees	289
Value	$953

Principal Crops.

	Acres	Bushels
Corn	11	164
Oats	16,125	162,566
Wheat	68	1,473
Barley	917	26,001
Dry edible beans	466	14,435
Potatoes	971	109,879

Hay and forage—	Acres	Tons
Timothy and clover mixed	6	6
Clover alone	18	36
Alfalfa	11	52
Other tame and cultivated grasses	2,472	3,638
Wild, salt, or prairie grasses	82	57
Grains cut green	16,466	25,181
All other hay and forage	5	12
Totals	19,060	28,982

Poultry products—	
Poultry raised, number	43,946
Eggs produced, dozen	236,642
Value poultry and eggs produced	$82,139

SAN MATEO COUNTY SUMMARY—Continued.

Honey and wax—	
Honey produced, pounds	5,458
Wax produced, pounds	193
Value of honey and wax produced	$810
Wool—	
Wool, fleeces shorn	1,013
Mohair and goat hair, fleeces shorn	26
Value wool and mohair produced	$1,162
Special crops—	
Potatoes, acres	971
All other vegetables, acres	3,210

Orchard fruits—	Number bearing trees
Apples	18,634
Apricots	3,694
Cherries	671
Peaches and nectarines	572
Pears	1,688
Prunes and plums	18,279
Total	43,655

Tropical fruits—	Number bearing trees
Figs	36
Lemons	1
Oranges	25
Olives	7,187
Total	7,249

Grapevines—	
Number in bearing	124,990
Small fruits—	
Strawberries, acres	56
Blackberries and dewberries, acres	10
All others, acres	3
Total	69

Nuts—	Number bearing trees
Almonds	94
Walnuts	223
Total	331

Irrigation.

Number of farms irrigated in 1909	75
Acres irrigated in 1909	3,648
Acreage enterprises were capable of irrigating in 1910	3,653
Acreage included in projects	3,983
Main ditches, number	57
Length, miles	58
Pumped wells, number	40
Cost of irrigation enterprises up to July 1, 1910	$90,921
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$24.89

Mineral Production in 1914.

	Amount	Value
Brick, thousand	950	$24,074
Gems	-----	200
Lime, barrels	6,581	845
Limestone, tons	153,329	75,941
Miscellaneous stone	-----	34,648
Salt, tons	27,500	76,750
Sandstone, tons	81,000	34,020
Total		$216,478

SANTA BARBARA COUNTY.

Date of creation, February 18, 1850.

Land area, 2,740 square miles.
County seat, Santa Barbara, city.
Population per square mile, 10.1.

	1890	1900	1910
Population	15,754	18,934	27,738
Population	5,864	6,587	11,659

Elevation, 130 feet.

1915:	Highest	Lowest		Inches		Inches
Temperature	98	34	Rainfall	21.42	Snow	0

Santa Barbara County is situated in the parallelogram formed by the trend in the California coast line made by Point Concepcion, the great continental headland. Its coast line is thus of considerable extent, being, in fact, about 100 miles in length. A chain of mountains, the Santa Ynez range, divides the county into two grand divisions. The southern division is the most populous. The surrounding country is agricultural, being devoted to the culture of walnuts, olives, lemons, and beans in large quantities.

The northern part contains four large valleys. Lompoc Valley is a very prosperous and fertile agricultural section. Much of the mustard seed used in the United States is grown in this district. Sweet pea seed is also grown here. Santa Ynez Valley is largely devoted to the raising of grain, as is the Los Alamos Valley. The Santa Maria Valley is the largest in southern California. Here is located the Union Sugar Company's factory at Betteravia. The hills on the southern side of this valley are the center of the large Santa Maria oil fields.

Santa Barbara has the best harbor in the county. There are large areas yet uncultivated and the county is ripe for immigration. Around Santa Maria the principal crops are sugar beets and beans of the pink and small white varieties. A large number of lemons are produced in the county, and it is also one of the principal walnut producing counties in the State, the annual shipments amounting to about 1,250 tons, which usually are of a very fine quality.

SANTA BARBARA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	17
3 to 9 acres	130
10 to 19 acres	140
20 to 49 acres	212
50 to 99 acres	164
100 to 174 acres	185
175 to 259 acres	105
260 to 499 acres	138
500 to 999 acres	93
1,000 acres and over	171
Total	1,355
Total in 1900	1,149

Land and Farm Areas.

Approximate land, acres	1,753,600
Land in farms in 1910	1,120,475
Land in farms in 1900	922,611
Improved land in farms in 1910	215,552
Improved land in farms in 1900	202,982
Woodland in farms	276,071
Other unimproved land	628,852

Value of all Farm Property.

Total value in 1910	$43.544,076
Total value in 1900	18,271,863
Per cent increase 1900-1910	138.3
Land in 1910	35,556,593
Land in 1900	14,849,440
Buildings in 1910	3,004,679
Buildings in 1900	1,375 293
Implements and machinery in 1910	804,264
Implements and machinery in 1900	365,770
Domestic animals, poultry, and bees in 1910	4,178,540
Domestic animals, poultry, and bees in 1900	1,681,363

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	11,690
Other cows	23,752
Yearling heifers	6,891
Calves	11,724
Yearling steers and bulls	8,636
Other steers and bulls	24,578
Total	87,576
Value	*$2,223,607
Horses—	
Mature horses	10,621
Yearling colts	1,442
Spring colts	971
Total	13,034
Value	$1,398,385
Mules—	
Mature mules	362
Yearling colts	56
Spring colts	25
Total	443
Value	$53,740
Asses and burros—	
Number	24
Value	$1,380
Swine—	
Mature hogs	15,113
Springs pigs	6,960
Total	22,073
Value	$162,635
Sheep—	
Rams, ewes, and wethers	60,205
Spring lambs	20,328
Total	80,533
Value	$275,259
Goats—	
Number	558
Value	$1,698
Total value all domestic animals	$4,119,104
Poultry and bees—	
Poultry of all kinds	89,995
Value	$46,815
Colonies of bees	4,072
Value	$12,621

Principal Crops.

	Acres	Bushels
Corn	1,240	25,979
Oats	9,494	233,171
Wheat	2,300	27,892
Barley	26,294	683,605
Dry edible beans	22,355	367,385
Potatoes	1,524	151,532

Hay and forage—	Acres	Tons
Timothy and clover mixed	100	150
Clover alone	25	100
Alfalfa	635	2,205
Other tame and cultivated grasses	223	267
Wild, salt, or prairie grasses	479	519
Grains cut green	47,602	64,690
All other hay and forage	1,006	2,215
Total	50,070	70,146

Poultry products—	
Poultry raised, number	91,159
Eggs produced, dozen	407,168
Value poultry and eggs produced	$151,719
Honey and wax—	
Honey produced, pounds	288,875
Wax produced, pounds	4,060
Value of honey and wax produced	$16,678
Wool—	
Wool, fleeces shorn	27,787
Mohair and goat hair, fleeces shorn	68
Value wool and mohair produced	$26,308
Special crops—	
Potatoes, acres	1,524
Sweet potatoes, acres	28
All other vegetables, acres	1,588
Sugar beets, acres	11,320

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*Includes animals, age and sex not specified.

SANTA BARBARA COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	2,744
Apricots	15,512
Cherries	659
Peaches and nectarines	9,560
Pears	2,612
Prunes and plums	2,730
Total	34,200

Tropical fruits—	Number bearing trees
Figs	858
Lemons	4,246
Oranges	46,181
Pomeloes	716
Olives	44,258
Total	99,023

Grapevines—	
Number in bearing	208,595

Small fruits—	
Strawberries, acres	24
Blackberries and dewberries, acres	32
All others, acres	7
Total, acres	63

Nuts—	Number bearing trees
Almonds	239
Pecans	70
Walnuts	96,776
Total	97,091

Irrigation.

Number of farms irrigated in 1909	137
Acres irrigated in 1909	12,012
Acreage enterprises were capable of irrigating in 1910	13,572
Acreage included in projects	13,603
Main ditches, number	76
Length, miles	75
Laterals, number	4
Length, miles	5
Flowing wells, number	7
Pumped wells, number	113
Cost of irrigation enterprises up to July 1, 1910	$370,186
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$27.28

Mineral Production in 1914.

	Amount	Value
Bituminous rock, tons	25,000	$50,000
Brick, thousand	2,100	16,800
Limestone, tons	6,157	11,263
Mineral water, gallons	160,400	152,432
Miscellaneous stone	-------	15,300
Natural gas, M cu. ft.	6,313,380	378,802
Petroleum, barrels	4,325,787	1,989,862
Sandstone, cubic feet	9,286	1,850
Other minerals	-------	70,000
Total		$2,686,309
Number of mineral springs		7

Manufactures in 1914.

SANTA BARBARA.

The population of Santa Barbara at the census of 1910 was 11,659 and it is estimated that it was 14,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	49	49	----------
Persons engaged in manufactures	495	340	45.6
Proprietors and firm members	46	43	----------
Salaried employees	71	58	----------
Wage-earners (average number)	378	239	58.2
Primary horsepower	837	452	85.2
Capital	$1,033,000	$758,000	36.3
Services	578,000	224,000	158.0
Salaries	117,000	44,000	165.9
Wages	461,000	180,000	156.1
Materials	395,000	439,000	—10.0
Value of products	1,271,000	843,000	50.8
Value added by manufacture (value of products less cost of materials)	876,000	404,000	116.8

Minus sign (—) denotes decrease.

SANTA CLARA COUNTY.

Date of creation, February 18, 1850.

Land area, 1,328 square miles.
County seat, San Jose, city.
Population per square mile, 62.9.

	1890	1900	1910
Population	48,005	60,216	83,539
Population	18,060	21,500	28,946

Elevation, 95 feet.	1915:	Highest	Lowest		Inches		Inches
	Temperature	97	23	Rainfall	21.72	Snow	0

Santa Clara County is situated to the south of San Francisco Bay, and is separated from the Pacific Ocean by San Mateo and Santa Cruz counties. The county seat is San Jose, and is distant 50 miles from San Francisco. The county is 47 miles wide from north to south, and through the center runs the favored Santa Clara Valley, with an average width of 15 miles, which is one of the most fertile valleys in the State. The county from the valley slopes upward through rolling hills to the summit of the Santa Cruz Mountains on the west. The county is famous for its large fruit production, especially of prunes.

The roads are excellent, and make all points easily accessible. More than 300 miles of these roads are sprinkled during the summer months.

Educational interests are represented by the Leland Stanford Junior University, University of Santa Clara, the State Normal School, The University of the Pacific, and the College of Notre Dame.

The valley is drained by a number of streams. In summer their watercourses greatly diminish and smaller ones wholly disappear; having their sources in the surrounding hills and sinking as they approach the valley, they augment the subterranean supply of the artesian wells.

SANTA CLARA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	68
3 to 9 acres	773
10 to 19 acres	1,186
20 to 49 acres	1,317
50 to 99 acres	562
100 to 174 acres	376
175 to 259 acres	141
260 to 499 acres	147
500 to 999 acres	75
1,000 acres and over	86
Total	4,731
Total in 1900	3,995

Land and Farm Areas.

Approximate land, acres	849,920
Land in farms in 1910	734,819
Land in farms in 1900	710,686
Improved land in farms in 1910	237,170
Improved land in farms in 1900	290,285
Woodland in farms	153,835
Other unimproved land	343,814

Value of all Farm Property.

Total value in 1910	$67,187,549
Total value in 1900	50,724,703
Per cent increase 1900-1910	32.5
Land in 1910	52,882,603
Land in 1900	42,270,340
Buildings in 1910	9,125,640
Buildings in 1900	5,332,710
Implements and machinery in 1910	1,942,339
Implements and machinery in 1900	1,287,560
Domestic animals, poultry, and bees in 1910	3,236,967
Domestic animals, poultry, and bees in 1900	1,834,093

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	12,181
Other cows	12,251
Yearling heifers	4,449
Calves	5,443
Yearling steers and bulls	3,133
Other steers and bulls	7,552
Total	46,030
Value	*$1,218,607
Horses—	
Mature horses	14,405
Yearling colts	899
Spring colts	512
Total	15,816
Value	$1,763,731

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*Includes animals, age and sex not specified.

SANTA CLARA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	267
Yearling colts	7
Total	274
Value	$29,026
Asses and burros—	
Number	11
Value	$150
Swine—	
Mature hogs	4,165
Spring pigs	3,184
Total	7,349
Value	$61,121
Sheep—	
Rams, ewes, and wethers	4,449
Spring lambs	5,606
Total	10,055
Value	$32,553
Goats—	
Number	163
Value	$665
Total value all domestic animals	$3,105,853
Poultry and bees—	
Poultry of all kinds	209,093
Value	$122,299
Colonies of bees	2,542
Value	$8,615

Principal Crops.

	Acres	Bushels
Corn	411	9,791
Oats	247	9,424
Wheat	376	10,198
Barley	8,903	200,893
Dry edible beans	706	8,810
Potatoes	1,085	105,617

Hay and forage—	Acres	Tons
Timothy alone	34	46
Clover alone	226	355
Alfalfa	3,073	11,486
Other tame and cultivated grasses	2,275	2,606
Wild, salt, or prairie grasses	1,203	1,352
Grains cut green	76,399	109,051
All other hay and forage	343	2,110
Totals	83,553	127,006

Poultry products—	
Poultry raised, number	233,729
Eggs produced, dozen	1,166,782
Value poultry and eggs produced	$410,877
Honey and wax—	
Honey produced, pounds	77,252
Wax produced, pounds	842
Value honey and wax produced	$6,203
Wool—	
Wool, fleeces shorn	4,765
Value wool and mohair produced	$3,596

Special crops—	
Potatoes, acres	1,085
All other vegetables, acres	4,241
Sugar beets, acres	1,135

Orchard fruits—	Number bearing trees
Apples	102,841
Apricots	783,585
Cherries	173,002
Peaches and nectarines	437,677
Pears	142,550
Prunes and plums	3,387,455
Total	5,043,766

Tropical fruits—	Number bearing trees
Figs	985
Lemons	996
Oranges	1,905
Pomeloes	57
Olives	13,945
Total	18,023

Grapevines—	
Number in bearing	5,584,480
Small fruits—	
Strawberries, acres	460
Blackberries and dewberries, acres	228
All others, acres	323
Total	1,011

Nuts—	Number bearing trees
Almonds	25,862
Pecans	136
Walnuts	19,070
Total	48,398

Irrigation.

Number of farms irrigated in 1909	1,101
Acres irrigated in 1909	37,637
Acreage enterprises were capable of irrigating in 1910	50,939
Acreage included in projects	60,140
Main ditches, number	458
Length, miles	228
Laterals, number	39
Length, miles	27
Flowing wells, number	438
Pumped wells, number	800
Cost of irrigation enterprises up to July 1, 1910	$1,337,216
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$26.25

Mineral Production in 1914.

	Amount	Value
Brick, thousand	15,900	$79,500
Magnesite, tons	1,425	14,250
Mineral water, gallons	29,000	10,750
Miscellaneous stone	-----	39,093
Petroleum, barrels	10,000	5,300
Quicksilver, flasks	2,407	118,063
Total		$266,956
Number of mineral springs		12

SANTA CRUZ COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 435 square miles.	Population	19,270	21,512	26,140
County seat, Santa Cruz, city.	Population	5,596	5,659	11,146
Population per square mile, 60.1.				

		Highest	Lowest		Inches		Inches
Elevation, 20 feet.	1915: Temperature	92	23	Rainfall	34.69	Snow	0

Santa Cruz fronts its entire length on the Pacific Ocean. It is separated from San Mateo and Santa Clara counties by the Santa Cruz Mountains, and from Monterey County by the Pajaro River. It is one of the smallest counties, and comprises a narrow strip of mountainous land about 40 miles long and 18 miles broad, forming a vast amphitheater, and sloping from the summits of the Santa Cruz range, whose highest elevation, Loma Prieta, is 4,000 feet, southward and westward to the bay of Monterey.

The curving line of shore and the corresponding curve of the mountain line inclose an irregular, crescent-shaped tract of country, with an average width of 20 miles. The sides of the mountain are closely set with forests of pine, redwood, madrone, and other trees, the redwoods having in many cases, attained gigantic growth.

The extent of the apple industry is shown by statistics, and is one of the most valuable industries. During the harvesting of the crop in the Pajaro Valley, this industry gives employment to several thousands. The annual shipments of green apples average from 3,500 to 4,000 carloads, and evaporated apples, about 150 to 200 carloads. Growers receive from $20 to $25 per ton delivered at the packing house. The leading varieties are Newtown Pippin, Bellflower, Red Pearmain, White Pearmain, Missouri Pippin, Baldwin, Rome Beauty, Spitzenberg, Winesap, Langford Seedling, and Ben Davis.

Of the small fruits, the strawberry is the most widely grown and furnishes a crop from about April 1st to December 1st, about 270 carloads being shipped in 1914.

In the southern part of the county a large acreage is devoted to the profitable growth of sugar beets, potatoes, beans, and onions.

Asparagus and rhubarb are grown for outside markets.

Seeds, bulbs, plants, and cut flowers are cultivated on a large scale.

This is one of the few places in the State where ginseng is cultivated. The exports of this root in 1914 from the United States to Hong Kong, the principal market, was about two-thirds cultivated and the remainder wild.

The Santa Cruz Portland cement plant has the largest capacity for the manufacture of cement of any in the State. There is a cold storage plant at Watsonville with a capacity of 500 carloads.

The fish hatchery at Brookdale, on Clear Creek, which was established in 1905, produces large quantities of steelhead trout and also of quinnat salmon and silver salmon.

SANTA CRUZ COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	18
3 to 9 acres	226
10 to 19 acres	198
20 to 49 acres	384
50 to 99 acres	293
100 to 174 acres	188
175 to 259 acres	60
260 to 499 acres	52
500 to 999 acres	25
1,000 acres and over	22
Total	1,466
Total in 1900	1,274

Land and Farm Areas.

Approximate land, acres	278,400
Land in farms in 1910	157,308
Land in farms in 1900	160,438
Improved land in farms in 1910	66,875
Improved land in farms in 1900	62,849
Woodland in farms	44,157
Other unimproved land	46,276

Value of all Farm Property.

Total value in 1910	$17,653,136
Total value in 1900	11,443,150
Per cent increase 1900-1910	54.3
Land in 1910	14,103,715
Land in 1900	9,094,410
Buildings in 1910	2,299,890
Buildings in 1900	1,452,020
Implements and machinery in 1910	461,107
Implements and machinery in 1900	216,930
Domestic animals, poultry, and bees in 1910	788,424
Domestic animals, poultry, and bees in 1900	649,790

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	4,210
Other cows	1,811
Yearling heifers	1,113
Calves	1,779
Yearling steers and bulls	438
Other steers and bulls	749
Total	10,100
Value	$259,560
Horses—	
Mature horses	3,914
Yearling colts	260
Spring colts	116
Total	4,290
Value	$435,787
Mules—	
Mature mules	84
Yearling colts	4
Total	88
Value	$8,150
Asses and burros—	
Number	6
Value	$125
Swine—	
Mature hogs	2,165
Spring pigs	1,509
Total	3,674
Value	$27,421
Sheep—	
Rams, ewes, and wethers	876
Spring lambs	703
Total	1,579
Value	$5,354
Goats—	
Number	1,043
Value	$3,230
Total value all domestic animals	$739,727
Poultry and bees—	
Poultry of all kinds	85,705
Value	$46,054
Colonies of bees	693
Value	$2,643

Principal Crops.

	Acres	Bushels
Corn	1,136	22,284
Oats	2,282	59,812
Wheat	217	3,629
Barley	1,000	31,226
Dry edible beans	577	12,615
Potatoes	1,080	128,977

Hay and forage—	Acres	Tons
Timothy alone	350	450
Clover alone	70	170
Alfalfa	255	1,090
Other tame and cultivated grasses	28	36
Wild, salt, or prairie grasses	29	29
Grains cut green	16,609	22,376
All other hay and forage	693	1,093
Totals	18,037	25,244

Poultry products—	
Poultry raised, number	79,015
Eggs produced, dozen	577,989
Value of poultry and eggs produced	$188,542
Honey and wax—	
Honey produced, pounds	11,032
Wax produced, pounds	98
Value of honey and wax produced	$1,207
Wool—	
Wool, fleeces shorn	799
Mohair and goat hair, fleeces shorn	630
Value of wool and mohair produced	$1,444
Special crops—	
Potatoes, acres	1,080
Sweet potatoes, acres	1
All other vegetables, acres	648
Sugar beets, acres	312

SANTA CRUZ COUNTY SUMMARY—Continued.

Orchard fruits—	Number bearing trees
Apples	647,136
Apricots	63,021
Cherries	17,608
Peaches and nectarines	11,868
Pears	23,100
Prunes and plums	112,269
Total	875,642

Tropical fruits—	Number bearing trees
Figs	333
Lemons	349
Oranges	330
Pomeloes	7
Olives	1,243
Total	2,279

Grapevines—	
Number in bearing	1,365,414

Small fruits—	
Strawberries, acres	489
Blackberries and dewberries, acres	116
All others, acres	139
Total	744

Nuts—	Number bearing trees
Almonds	240
Pecans	5
Walnuts	4,015
Total	4,757

Irrigation.

Number of farms irrigated in 1909	106
Acres irrigated in 1909	1,201
Acreage enterprises were capable of irrigating in 1910	1,313
Acreage included in projects	2,232
Main ditches, number	81
Length, miles	41
Flowing wells, number	2
Pumped wells, number	58
Cost of irrigation enterprises up to July 1, 1910	$76,621
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$58.36

Mineral Production in 1914.

	Amount	Value
Bituminous rock, tons	40,540	$115,500
Lime, barrels	173,282	157,011
Limestone, tons	14,666	25,082
Miscellaneous stone	-----	4,276
Other minerals	-----	1,341,089
Total		$1,642,958
Number of mineral springs		3

Manufactures in 1914.

SANTA CRUZ.

The population of Santa Cruz at the census of 1910 was 11,146, and it is estimated that it was 13,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	80	34	----------
Persons engaged in manufactures	558	388	43.8
Proprietors and firm members	94	31	----------
Salaried employees	62	83	----------
Wage-earners (average number)	402	274	46.7
Primary horsepower	2,832	1,827	55.0
Capital	$3,212,000	$2,605,000	23.3
Services	326,000	287,000	13.6
Salaries	60,000	77,000	—22.1
Wages	266,000	210,000	26.7
Materials	745,000	667,000	11.7
Value of products	1,324,000	1,161,000	14.0
Value added by manufacture (value of products less cost of materials)	579,000	494,000	17.2

Minus sign (—) denotes decrease.

SHASTA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 3,858 square miles.	Population	12,133	17.318	18,920
County seat, Redding, city.	Population	1,821	2,946	3,572
Population per square mile, 4.9.				

		Highest.	Lowest		Inches		Inches
Elevation, 552 feet.	1915: Temperature	111	22	Rainfall	57.96	Snow	T.

Shasta County lies at the head of the famous Sacramento Valley. One mile north of Redding, the county seat, the valley ends and the canyon, second only in fame to the valley, which bears the name of the great waterway in the State, begins.

Covering a portion of eastern Shasta are the Sierra Nevada Mountains and on the northeastern boundary is the Coast Range. These are lofty, some peaks exceeding 5,000 feet in height, and are very rugged. On the extreme eastern border of the county is Lassen Peak, raising its mighty head 10,577 feet above sea level. This peak has attracted much attention in recent years owing to numerous great eruptions. This mountain is timbered two-thirds of the way up. Hot and boiling springs, and others noted for their medicinal qualities, abound in this region. The southwestern portion of this section is a succession of rounded hills, varying in height from 50 to 200 feet, while the central and southern portions consist of tablelands, varying in altitude from 500 to 700 feet. Fertile valleys predominate.

Shasta is noted for the number and beauty of its streams. First in importance is the Sacramento River, which enters the county on its northern boundary, traversing it throughout to its southern borders. The Sacramento is augmented by the combined McCloud, Pit, and Fall rivers, the former finding its source at Mount Shasta on the extreme north, enters the county and travels in a southerly direction, emptying into the Pit, which earlier has received the Fall River flow, and continuing still in a southerly course meets and enters the Sacramento at a point a few miles north of Kennett. Most beautiful of all northern streams is the Fall River.

Beautiful resorts and springs abound. The mountains are heavily timbered with sugar pine, cedar, fir, and other valuable timbers.

The prune, peach, pear, and plum thrive, while grapes have proven a success in the valley districts.

Anderson, twelve miles south of Redding, the fruit and lumber center of the county, and Kennett, seventeen miles to the north of the county seat, are the two next important centers.

Shasta's pre-eminence in mineral production, giving her the title of "banner county," is largely due to her immense copper output.

(*Information supplied by the Chamber of Commerce.*)

While dry farming is carried on successfully irrigation is being inaugurated in different sections of the county. An irrigation system to irrigate about 30,000 acres under what is known as the Anderson-Cottonwood Irrigation District, is being built this year.

Redding, the county seat of Shasta County, lies at the extreme head of the Sacramento Valley and on account of its advantageous position is the commercial center of both the mining and agricultural industries. The olive is extensively grown and has become an important factor in the growth of the county.

SHASTA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	16
10 to 19 acres	29
20 to 49 acres	163
50 to 99 acres	111
100 to 174 acres	300
175 to 259 acres	96
260 to 499 acres	150
500 to 999 acres	93
1,000 acres and over	66
Total	1,010
Total in 1900	1,221

Land and Farm Areas.

Approximate land, acres	2,469,120
Land in farms in 1910	389,218
Land in farms in 1900	347,120
Improved land in farms in 1910	96,217
Improved land in farms in 1900	86,540
Woodland in farms	151,113
Other unimproved land	141,888

Value of all Farm Property.

Total value in 1910	$7,847,929
Total value in 1900	4,420,423
Per cent increase 1900-1910	77.5
Land in 1910	5,403,079
Land in 1900	2,980,620
Buildings in 1910	851,750
Buildings in 1900	538,500
Implements and machinery in 1910	289,511
Implements and machinery in 1900	163,450
Domestic animals, poultry, and bees in 1910	1,303,589
Domestic animals, poultry, and bees in 1900	737,853

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,923
Other cows	15,433
Yearling heifers	3,678
Calves	3,308
Yearling steers and bulls	3,197
Other steers and bulls	5,580
Total	34,119
Value	$677,694
Horses—	
Mature horses	4,516
Yearling colts	488
Spring colts	213
Total	5,217
Value	$396,414
Mules—	
Mature mules	224
Yearling colts	57
Spring colts	13
Total	294
Value	$23,225
Asses and burros—	
Number	23
Value	$2,635
Swine—	
Mature hogs	12,832
Spring pigs	5,968
Total	18,800
Value	$96,329
Sheep—	
Rams, ewes, and wethers	11,449
Spring lambs	5,574
Total	17,023
Value	$44,945
Goats—	
Number	18,403
Value	$41,501
Total value all domestic animals	$1,282,743
Poultry and bees—	
Poultry of all kinds	35,873
Value	$19,226
Colonies of bees	689
Value	$1,620

Principal Crops.

	Acres	Bushels
Corn	163	4,655
Oats	723	8,915
Wheat	3,783	45,022
Barley	1,298	21,551
Dry edible beans	49	685
Potatoes	243	27,756

Hay and forage—	Acres	Tons
Timothy alone	3,083	4,118
Timothy and clover mixed	2,165	2,847
Clover alone	269	530
Alfalfa	6,698	16,874
Other tame and cultivated grasses	917	1,077
Wild, salt, or prairie grasses	13,158	12,716
Grains cut green	8,525	7,836
All other hay and forage	526	580
Total	35,341	46,578

Poultry products—	
Poultry raised, number	52,607
Eggs produced, dozen	199,858
Value poultry and eggs produced	$73,767
Honey and wax—	
Honey produced, pounds	8,466
Wax produced, pounds	185
Value of honey and wax produced	$1,013
Wool—	
Wool, fleeces shorn	17,862
Mohair and goat hair, fleeces shorn	11,606
Value wool and mohair produced	$25,705
Special crops—	
Potatoes, acres	243
Sweet potatoes, acres	16
All other vegetables, acres	577

SHASTA COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	35,440
Apricots	839
Cherries	2,785
Peaches and nectarines	98,950
Pears	33,952
Prunes and plums	87,959
Total	262,136

Tropical fruits—	Number bearing trees
Figs	2,306
Lemons	7
Oranges	55
Olives	9,616
Total	11,986

Grapevines—	
Number in bearing	117,481

Small fruits—	
Strawberries, acres	44
Blackberries and dewberries, acres	32
All others, acres	19
Total, acres	95

Nuts—	Number bearing trees
Almonds	8,056
Pecans	7
Walnuts	1,168
Total	9,339

Irrigation.

Number of farms irrigated in 1909	639
Acres irrigated in 1909	33,004
Acreage enterprises were capable of irrigating in 1910	36,564
Acreage included in projects	72,653
Main ditches, number	446
Length, miles	678
Laterals, number	130
Length, miles	81
Flowing wells, number	2
Pumped wells, number	34
Cost of irrigation enterprises up to July 1, 1910	$430,766
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$11.78

Mineral Production in 1914.

	Amount	Value
Brick, thousand	1,594	$10,223
Chromite, tons	867	4,884
Copper, pounds	25,122,766	3,341,328
Gold	--------	1,100,000
Iron, tons	1,436	5,128
Lead, pounds	21,565	841
Lime, barrels	8,657	5,163
Limestone, tons	36,997	30,026
Mineral water, gallons	30,000	6,850
Miscellaneous stone	--------	125
Pyrite, tons	69,438	195,362
Silver	--------	345,000
Total		$5,044,930
Number of mineral springs		16

SIERRA COUNTY.

Date of creation, April 16, 1852.

		1890	1900	1910
Land area, 923 square miles.	Population	5,051	4,017	4,098
County seat, Downieville, township.	Population	-----	-----	751
Population per square mile, 4.4.				

	Highest	Lowest		Inches		Inches
Elevation, 3,150 feet. 1915: Temperature	104	12	Rainfall	75.94	Snow	45.6

Sierra County has an area practically all mountainous. The altitude ranges from 2,000 to 8,600 feet, the highest elevation being that of the Sierra Buttes, but the greater portion has an elevation of from 4,000 to 5,000 feet.

The main ridge of the Sierra Nevada crosses the eastern part from south to north. Several spurs traverse the county from east to west, forming the watersheds of the four principal streams which make the drainage system of the western part. These streams consist of the Middle Yuba River on the south, the North Yuba near the center, and Canyon Creek and Slate Creek on the north, and in the eastern end the many streams that form the headwaters of the Feather and Truckee rivers. Of the peculiar topographical features are the expansive valleys and lakes, lying among the loftiest peaks of the Sierra. The lakes vary from one-eighth of a mile to three or four miles in length, most of them circular, and, considering their small size, are remarkable for their depth.

The important body of agricultural land is Sierra Valley. It extends over the boundary line into Plumas County, and is the largest and the most elevated of the valley of the Sierra, being 4,750 feet above sea level. It is 30 miles in length and 10 miles in width. This valley is particularly adapted to stock raising and dairy purposes. There are several creameries in the valley. The soil is deep, black loam, largely admixed with rich mold.

Since 1849, the principal industry has been gold mining.

The greater portion is practically covered with a virgin belt of soft timber. The lumber cut runs into many millions of feet.

SIERRA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	6
10 to 19 acres	3
20 to 49 acres	4
50 to 99 acres	5
100 to 174 acres	25
175 to 259 acres	4
260 to 499 acres	19
500 to 999 acres	18
1,000 acres and over	25
Total	110
Total in 1900	141

Land and Farm Areas.

Approximate land, acres	590,720
Land in farms in 1910	84,220
Land in farms in 1900	74,609
Improved land in farms in 1910	30,794
Improved land in farms in 1900	26,687
Woodland in farms	18,168
Other unimproved land	35,258

Value of all Farm Property.

Total value in 1910	$1,650,799
Total value in 1900	995,395
Per cent increase 1900-1910	65.8
Land in 1910	962,575
Land in 1900	564,990
Buildings in 1910	262,125
Buildings in 1900	179,770
Implements and machinery in 1910	65,524
Implements and machinery in 1900	37,480
Domestic animals, poultry, and bees in 1910	360,575
Domestic animals, poultry, and bees in 1900	213,155

SIERRA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	[illegible]
Other cows	[illegible]
Yearling heifers	[illegible]
Calves	[illegible]
Yearling steers and bulls	[illegible]
Other steers and bulls	[illegible]
Total	[illegible]
Value	[illegible]
Horses—	
Mature horses	1,199
Yearling colts	155
Spring colts	40
Total	1,394
Value	[illegible]
Mules—	
Mature mules	[illegible]
Value	[illegible]
Asses and burros—	
Number	4
Value	[illegible]
Swine—	
Mature hogs	370
Spring pigs	294
Total	664
Value	[illegible]
Sheep—	
Rams, ewes and wethers	[illegible]
Spring lambs	[illegible]
Total	[illegible]
Value	[illegible]
Goats—	
Number	73
Value	$164
Total value all domestic animals	$357,497
Poultry and bees—	
Poultry of all kinds	[illegible]
Value	[illegible]
Colonies of bees	[illegible]
Value	$228

Principal Crops.

	Acres	Bushels
Corn	1	40
Oats	[illegible]	[illegible]
Wheat	[illegible]	[illegible]
Barley	[illegible]	[illegible]
Potatoes	46	[illegible]

Hay and forage—	Acres	Tons
Timothy alone	388	[illegible]
Timothy and clover mixed	1,789	[illegible]
Clover alone	26	37
Alfalfa	1,125	[illegible]
Other tame and cultivated grasses	889	922
Wild, salt, or prairie grasses	15,772	16,258
Grains cut green	688	729
Totals	20,622	22,284

Poultry products—	
Poultry raised, number	6,995
Eggs produced, dozen	24,877
Value poultry and eggs produced	$11,788
Honey and wax—	
Honey produced, pounds	2,161
Wax produced, pounds	10
Value of honey and wax produced	$220
Wool—	
Wool, fleeces shorn	[illegible]
Value wool and mohair produced	[illegible]
Special crops—	
Potatoes, acres	46
All other vegetables, acres	33

Orchard fruits—	Number bearing trees
Apples	3,368
Cherries	67
Peaches and nectarines	127
Pears	148
Prunes and plums	292
Total	4,002

Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	1
All others, acres	3
Total	6

Nuts—	Number bearing trees
Walnuts	24

Irrigation.

Number of farms irrigated in 1909	94
Acres irrigated in 1909	17,504
Acreage enterprises were capable of irrigating in 1910	27,505
Acreage included in projects	28,249
Main ditches, number	119
Length, miles	170
Laterals, number	4
Length, miles	1
Cost of irrigation enterprises up to July 1, 1910	$80,650
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$5.98

Mineral Production in 1914.

	Value
Gold	$730,000
Silver	3,000
Total	$733,000
Number of mineral springs	2

SISKIYOU COUNTY.

Date of creation, March 22, 1852.

Land area, 6,256 square miles.
County seat, Yreka, town.
Population per square mile, 3.0.

	1890	1900	1910
Population	12,163	16,962	18,801
Population	1,100	1,254	1,134

Dunsmuir (Station):

		Highest	Lowest		Inches		Inches
Elevation, 2,285 feet.	1915: Temperature	105	18	Rainfall	65.30	Snow	36.5

Siskiyou is one of the northern counties of the State, adjoining Oregon for 80 miles on the north. Of its area of 6,256 square miles, 1,500 square miles are valley; the remainder is mountains and forest. Much of the agricultural land is farmed without irrigation, producing good crops of wheat, barley, and in some localities alfalfa and timothy. The so-called desert lands were long considered of little value save for pasturage, but are now being successfully farmed, and require only the application of water to produce abundant crops.

The agricultural lands are chiefly comprised in Scott Valley in the western portion of the county, Shasta Valley and Little Shasta in the central portion, and McCloud and Butte valleys in the eastern portion.

Timber is everywhere; there are thousands of sections that will cut from ten to twenty million feet of yellow and sugar pine, besides large quantities of red fir and cedar.

The Sierra Nevada and Coast Range mountains meet here. The altitude ranges from 2,000 feet in the valleys to 14,000 feet on the mountain peaks, the highest of these being Mount Shasta. There are localities where snow seldom falls, and regions of perpetual snow. These conditions make it one of the most scenic of the counties.

The Marble Mountains, now but little known to tourists, will in time rival the Kings River Canyon and the Yosemite Valley. Chief among the noted resorts are the famous Shasta Springs and Upper Soda Springs, all situated in the Sacramento River Canyon, just over the border of Shasta County. At Sisson, at the base of Mount Shasta, the largest fish hatchery in the United States is located.

Lumbering is the chief industry, with mining and live stock a close second and third.

SISKIYOU COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	21
10 to 19 acres	36
20 to 49 acres	88
50 to 99 acres	98
100 to 174 acres	388
175 to 259 acres	84
260 to 499 acres	199
500 to 999 acres	124
1,000 acres and over	75
Total	1,114
Total in 1900	931

Land and Farm Areas.

Approximate land, acres	4,003,840
Land in farms in 1910	455,876
Land in farms in 1900	452,859
Improved land in farms in 1910	186,147
Improved land in farms in 1900	181,029
Woodland in farms	82,544
Other unimproved land	187,185

Value of all Farm Property.

Total value in 1910	$14,270,302
Total value in 1900	7,704,769
Per cent increase 1900-1910	85.2
Land in 1910	10,352,935
Land in 1900	5,084,110
Buildings in 1910	1,411,810
Buildings in 1900	1,056,390
Implements and machinery in 1910	420,745
Implements and machinery in 1900	284,520
Domestic animals, poultry and bees in 1910	2,084,812
Domestic animals, poultry and bees in 1900	1,279,749

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	7,018
Other cows	14,781
Yearling heifers	5,965
Calves	4,919
Yearling steers and bulls	5,359
Other steers and bulls	6,513
Total	45,079
Value	*$1,010,902
Horses—	
Mature horses	7,690
Yearling colts	1,037
Spring colts	423
Total	9,150
Value	$834,467
Mules—	
Mature mules	390
Yearling colts	76
Spring colts	37
Total	503
Value	$44,929
Asses and burros—	
Number	22
Value	$4,610
Swine—	
Mature hogs	6,116
Spring pigs	3,396
Total	9,512
Value	$58,475
Sheep—	
Rams, ewes, and wethers	18,013
Spring lambs	11,909
Total	29,922
Value	$99,082
Goats—	
Number	384
Value	$1,079
Total value all domestic animals	$2,053,544
Poultry and bees—	
Poultry of all kinds	43,413
Value	$22,568
Colonies of bees	2,775
Value	$8,700

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*Includes animals, age and sex not specified.

Principal Crops.

	Acres	Bushels
Corn	89	3,165
Oats	3,148	93,076
Wheat	17,872	224,512
Barley	4,282	60,118
Dry edible beans	10	272
Potatoes	655	76,218

Hay and forage—	Acres	Tons
Timothy alone	1,278	2,671
Timothy and clover mixed	12,792	23,178
Clover alone	168	405
Alfalfa	22,492	48,478
Other tame and cultivated grasses	3,432	5,459
Wild, salt, or prairie grasses	10,114	12,913
Grains cut green	7,651	6,831
All other hay and forage	49	178
Total	57,976	100,113

Poultry products—	
Poultry raised, number	57,444
Eggs produced, dozens	254,107
Value poultry and eggs produced	$93,177
Honey and wax—	
Honey produced, pounds	85,322
Wax produced, pounds	324
Value of honey and wax produced	$8,317
Wool—	
Wool, fleeces shorn	14,975
Mohair and goat hair, fleeces shorn	134
Value wool and mohair produced	$23,038

SISKIYOU COUNTY SUMMARY—Continued.

Special crops—	
Potatoes, acres	655
All other vegetables, acres	673
Sugar beets, acres	128

Orchard fruits—	Number bearing trees
Apples	31,055
Apricots	356
Cherries	1,850
Peaches and nectarines	4,371
Pears	2,300
Prunes and plums	5,683
Total	45,615

Tropical fruits—	Number bearing trees
Figs	3
Lemons	2
Total	5

Grapevines—	
Number in bearing	2,473
Small fruits—	
Strawberries, acres	7
Blackberries and dewberries, acres	10
All others, acres	14
Total	31

Nuts—	Number bearing trees
Almonds	83
Pecans	2
Walnuts	30
Total	185

Irrigation.

Number of farms irrigated in 1909	636
Acres irrigated in 1909	60,301
Acreage enterprises were capable of irrigating in 1910	66,866
Acreage included in projects	79,161
Main ditches, number	595
Length, miles	688
Laterals, number	172
Length, miles	41
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$370,627
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$5.54

Mineral Production in 1914.*

	Amount	Value
Coal, tons	100	$500
Gold		312,000
Lead, pounds	58	2
Lime, barrels	677	629
Mineral water, gallons	650,000	65,000
Miscellaneous stone		5,371
Sandstone, cubic feet	250	150
Silver		1,100
Total		$384,752
Number mineral springs		28

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*The coal deposits north of Yreka, in the vicinity of Hornbrook and Ager, have furnished a small amount of coal for domestic use for several years. It is a good grade of lignite, burns freely and leaves no clinkers.

SOLANO COUNTY.

Date of creation, February 18, 1850.

Land area, 822 square miles.
County seat, Fairfield, town.
Population per square mile, 33.5.

	1890	1900	1910
Population	20,946	24,143	27,559
Population	-----	-----	834

Suisun (Station):

		Highest	Lowest		Inches		Inches
Elevation, 20 feet.	1915: Temperature	104	26	Rainfall	19.63	Snow	0

In the foothills of the Coast Range on its western border, and extending across broad acres of the fertile land till its eastern confines are marked by the Sacramento River, lies Solano County.

A considerable acreage is devoted to grain raising. Thousands of cattle, horses, and sheep graze on the upland pastures and marsh lands. The soil is unexcelled, even in California, for productiveness. All fruits, especially prunes, peaches, apricots, and pears, grow to perfection; citrus fruits are also raised.

In the eastern section of the county is another rich section, the delta lands of the Sacramento River being noted for their productiveness.

This favored section is of a limited area. From east to west its extreme length is 45 miles, while from north to south the county measures 35 miles.

SOLANO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	45
10 to 19 acres	60
20 to 49 acres	198
50 to 99 acres	170
100 to 174 acres	167
175 to 259 acres	89
260 to 499 acres	156
500 to 999 acres	144
1,000 acres and over	108
Total	1,143
Total in 1900	1,151

Land and Farm Areas.

Approximate land, acres	526,080
Land in farms in 1910	474,866
Land in farms in 1900	480,551
Improved land in farms in 1910	310,452
Improved land in farms in 1900	314,058
Woodland in farms	44,534
Other unimproved land	119,880

Value of all Farm Property.

Total value in 1910	$28,727,683
Total value in 1900	20,780,434
Per cent increase 1900-1910	38.2
Land in 1910	23,025,081
Land in 1900	16,903,310
Buildings in 1910	2,278,540
Buildings in 1900	1,905,970
Implements and machinery in 1910	767,136
Implements and machinery in 1900	649,320
Domestic animals, poultry, and bees in 1910	2,656,926
Domestic animals, poultry, and bees in 1900	1,321,834

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	9,279
Other cows	4,257
Yearling heifers	1,933
Calves	3,720
Yearling steers and bulls	1,187
Other steers and bulls	1,408
Total	21,784
Value	$605,378
Horses—	
Mature horses	6,993
Yearling colts	695
Spring colts	362
Total	8,050
Value	$884,500
Mules—	
Mature mules	2,157
Yearling colts	84
Spring colts	78
Total	2,319
Value	$295,866
Asses and burros—	
Number	23
Value	$2,800
Swine—	
Mature hogs	8,836
Spring pigs	4,732
Total	13,568
Value	$89,528

SOLANO COUNTY SUMMARY—Continued.

Sheep—	
Rams, ewes, and wethers	96,921
Spring lambs	73,232
Total	170,153
Value	$737,457
Goats—	
Number	392
Value	$1,218
Total value all domestic animals	$2,616,747
Poultry and bees—	
Poultry of all kinds	74,683
Value	$39,384
Colonies of bees	256
Value	$795

Principal Crops.

	Acres	Bushels
Corn	91	935
Oats	1,306	25,711
Wheat	20,924	391,753
Barley	41,647	1,263,357
Dry edible beans	2,553	65,755
Potatoes	311	42,416

Hay and forage—	Acres	Tons
Timothy alone	2,566	2,856
Timothy and clover mixed	375	381
Clover alone	60	174
Alfalfa	2,145	10,617
Other tame and cultivated grasses	381	636
Wild, salt, or prairie grasses	496	771
Grains cut green	33,641	41,552
All other hay and forage	29	41
Totals	39,693	57,028

Poultry products—	
Poultry raised, number	66,403
Eggs produced, dozen	426,261
Value poultry and eggs produced	$128,295
Honey and wax—	
Honey produced, pounds	2,873
Value of honey and wax produced	$491
Wool—	
Wool, fleeces shorn	157,499
Mohair and goat hair, fleeces shorn	3
Value wool and mohair produced	$161,312
Special crops—	
Potatoes, acres	311
All other vegetables, acres	650
Sugar beets, acres	4

Orchard fruits—	Number bearing trees
Apples	4,862
Apricots	310,262
Cherries	53,923
Peaches and nectarines	341,266
Pears	182,194
Prunes and plums	465,341
Total	1,357,911

Tropical fruits—	Number bearing trees
Figs	4,598
Lemons	126
Oranges	2,950
Pomeloes	15
Olives	1,221
Total	8,911

Grapevines—	
Number in bearing	1,213,265
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	5
All others, acres	2
Total	12

Nuts—	Number bearing trees
Almonds	98,276
Pecans	134
Walnuts	1,806
Total	100,239

Irrigation.

Number of farms irrigated in 1909	150
Acres irrigated in 1909	3,610
Acreage enterprises were capable of irrigating in 1910	7,160
Acreage included in projects	8,192
Main ditches, number	20
Length, miles	22
Pumped wells, number	125
Cost of irrigation enterprises up to July 1, 1910	$135,532
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$18.93

Mineral Production in 1914.

	Amount	Value
Limestone, tons	86,128	$86,128
Mineral water, gallons	43,020	5,208
Miscellaneous stone	-----	71,288
Natural gas, M cu. ft.	5,357	5,546
Quicksilver, flasks	320	15,696
Other minerals	-----	1,500,000
Total		$1,683,866
Number of mineral springs		2

Manufactures in 1914.

VALLEJO.

The population of Vallejo at the census of 1910 was 11,340, and it is estimated that it was 13,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	29	23	
Persons engaged in manufactures	355	271	31.0
Proprietors and firm members	30	22	
Salaried employees	33	46	
Wage-earners (average number)	292	203	43.8
Primary horsepower	1,656	1,616	2.5
Capital	$1,667,000	$1,559,000	6.9
Services	293,000	259,000	13.1
Salaries	46,000	75,000	—38.7
Wages	247,000	184,000	34.2
Materials	2,046,000	1,404,000	45.7
Value of products	3,072,000	1,896,000	62.0
Value added by manufacture (value of products less cost of materials)	1,026,000	492,000	108.5

Minus sign (—) denotes decrease.

SONOMA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 1,577 square miles.	Population	32,721	38,480	48,394
County seat, Santa Rosa, city.	Population	5,220	6,673	7,817
Population per square mile, 30.7.				

		Highest	Lowest		Inches		Inches
Elevation, 181 feet.	1915: Temperature	103	18	Rainfall	42.30	Snow	0

Sonoma County is bounded on the west by the Pacific Ocean, for more than 65 miles that boundary conforming to the irregularities of the shore, while on San Pablo Bay it has a frontage of 20 miles.

The great central valley extends the entire length of the county from south to north. The area on which rough stone interferes with farming operations is small. Out of the area of land in the county at least 200,000 acres are valley land, the richest soil known, being a black loam; 200,000 acres are rolling, or higher tableland, of exceedingly rich, alluvial, brown soil, with considerable sand. This is the best fruit land. At least 100,000 acres of mountain land are adapted to grazing, and about 80,000 acres are covered with redwood timber of a magnificent growth.

Sonoma Valley is about 20 miles in length, with an average width of 8 miles. It lies parallel to Petaluma Valley, from which it is separated by a range of mountains.

The streams and watercourses of Sonoma County are numerous. Russian River, the largest stream, enters on the north, flows in a southeasterly direction for 20 miles, turns at Fitch Mountain and finds its way to the largest depression in the Santa Rosa Basin, from which it breaks through a gap in the Coast Range to the Pacific Ocean. This river gathers the waters from three-fifths of the area of the county. Owing to the abundant rainfall little or no irrigation is required, as is the case in some of the valley counties.

Sonoma County has a large acreage in wine grapes, nost of which are made into dry wines. The average price for grapes in 1914 was $15 to $17 per ton, according to varieties. Beside wine, fruit, dairy and stock industries, the county produces more poultry and eggs than any other part of the State. Olive culture is increasing. Sonoma and Sacramento counties are the largest producers of hops in the State. In 1912 Sonoma produced 35,712 bales of hops, in 1914, 24,284 bales, and in 1915, 29,790 bales.

Cattle are raised on a large scale, principally for dairying purposes. The breeds of milch cows represented are mostly Jerseys, Holsteins, and Ayrshires, with some strains of Durhams and fine American breeds.

SONOMA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	40
3 to 9 acres	916
10 to 19 acres	890
20 to 49 acres	1,040
50 to 99 acres	522
100 to 174 acres	508
175 to 259 acres	233
260 to 499 acres	299
500 to 999 acres	202
1,000 acres and over	122
Total	4,772
Total in 1900	3,676

Land and Farm Areas.

Approximate land, acres	1,009,280
Land in farms in 1910	744,644
Land in farms in 1900	785,064
Improved land in farms in 1910	248,271
Improved land in farms in 1900	221,374
Woodland in farms	278,507
Other unimproved land	217,866

Value of all Farm Property.

Total value in 1910	$55,351,049
Total value in 1900	33,071,707
Per cent increase 1900-1910	67.4
Land in 1910	41,512,706
Land in 1900	25,286,750
Buildings in 1910	8,758,787
Buildings in 1900	4,646,580
Implements and machinery in 1910	1,326,832
Implements and machinery in 1900	847,240
Domestic animals, poultry, and bees in 1910	3,752,724
Domestic animals, poultry, and bees in 1900	2,291,137

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	24,961
Other cows	5,835
Yearling heifers	4,804
Calves	9,517
Yearling steers and bulls	1,805
Other steers and bulls	1,705
Total	48,727
Value	*$1,166,971
Horses—	
Mature horses	12,611
Yearling colts	733
Spring colts	384
Total	13,728
Value	$1,355,510
Mules—	
Mature mules	388
Yearling colts	8
Spring colts	2
Total	398
Value	$48,025
Asses and burros—	
Number	28
Value	$620
Swine—	
Mature hogs	10,995
Spring pigs	7,428
Total	18,423
Value	$125,448
Sheep—	
Rams, ewes, and wethers	44,095
Spring lambs	21,220
Total	65,315
Value	$224,274
Goats—	
Number	2,991
Value	7,962
Total value all domestic animals	$2,928,810
Poultry and bees—	
Poultry of all kinds	1,362,399
Value	$821,299
Colonies of bees	824
Value	$2,615

Principal Crops.

	Acres	Bushels
Corn	1,681	44,331
Oats	468	20,156
Wheat	56	1,445
Barley	361	8,795
Dry edible beans	7	83
Potatoes	2,279	161,597

Hay and forage—	Acres	Tons
Timothy alone	50	68
Timothy and clover mixed	22	40
Clover alone	251	370
Alfalfa	5,565	10,461
Other tame and cultivated grasses	1,509	1,842
Wild, salt, or prairie grasses	6,507	7,346
Grains cut green	47,021	65,919
All other hay and forage	1,426	1,903
Total	62,351	87,949

Poultry products—	
Poultry raised, number	1,512,601
Eggs produced, dozens	9,470,880
Value poultry and eggs produced	$3,038,518
Honey and wax—	
Honey produced, pounds	7,014
Wax produced, pounds	44
Value of honey and wax produced	$941
Wool—	
Wool, fleeces shorn	75,925
Mohair and goat hair, fleeces shorn	2,330
Value wool and mohair produced	$74,951

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*Includes animals, age and sex not specified.

SONOMA COUNTY SUMMARY—Continued.

Special crops—	
Potatoes, acres	2,279
All other vegetables, acres	954

Orchard fruits—	Number bearing trees
Apples	386,740
Apricots	9,087
Cherries	43,927
Peaches and nectarines	237,220
Pears	109,965
Prunes and plums	569,232
Total	1,334,105

Tropical fruits—	Number bearing trees
Figs	3,850
Lemons	396
Oranges	5,047
Pomeloes	8
Olives	10,863
Total	20,226

Grapevines—	
Number in bearing	17,939,972
Small fruits—	
Strawberries, acres	103
Blackberries and dewberries, acres	930
All others, acres	438
Total	1,471

Nuts—	Number bearing trees
Almonds	2,893
Pecans	43
Walnuts	11,955
Total	16,631

Irrigation.

Number of farms irrigated in 1909	38
Acres irrigated in 1909	631
Acreage enterprises were capable of irrigating in 1910	761
Acreage included in projects	951
Main ditches, number	32
Length, miles	21
Pumped wells, number	11
Cost of irrigation enterprises up to July 1, 1910	$13,801
Average cost per acre irrigation enterprises were capable of irrigating in 1910	18.14

Mineral Production in 1914.

Substance	Amount	Value
Magnesite, tons	213	$2,130
Mineral water, gallons	89,015	46,160
Miscellaneous stone		276,516
Quicksilver, flasks	13	638
Other minerals		700
Total		$326,144
Number of mineral springs		21

STANISLAUS COUNTY.

Date of creation, April 1, 1854.

Land area, 1,450 square miles.
County seat, Modesto, city.
Population per square mile, 15.5.

	1890	1900	1910
Population	10,040	9,550	22,522
Population	2,402	2,024	4,034

		Highest	Lowest		Inches		Inches
Elevation, 90 feet.	1915: Temperature	106	18	Rainfall	13.22	Snow	0

Stanislaus County lies in the northern end of the great San Joaquin Valley, 114 miles from San Francisco and 30 miles from tidewater on the San Joaquin River. It is bounded by the Sierra Nevada Mountains on the east and the Coast Range Mountains on the west. The county is drained by three large rivers, the Stanislaus, the Tuolumne, and the San Joaquin. The soil ranges from a light sandy loam in the southerly part to a heavy sandy loam in the central part and adobe and redlands in the east. The county is crossed by four lines of railways, while the Sierra road connects Oakdale and vicinity with the mountain counties to the north.

The county has a large acreage in barley, oats and wheat, and is the largest producer of butter in the State, the total quantity in 1914 being 8,184,390 pounds. Fruits also grow well, especially peaches, apricots, and figs.

STANISLAUS COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	13
3 to 9 acres	153
10 to 19 acres	319
20 to 49 acres	1,046
50 to 99 acres	439
100 to 174 acres	192
175 to 259 acres	83
260 to 499 acres	125
500 to 999 acres	142
1,000 acres and over	175
Total	2,687
Total in 1900	951

Land and Farm Areas.

Approximate land, acres	928,000
Land in farms in 1910	649,392
Land in farms in 1900	830,692
Improved land in farms in 1910	512,189
Improved land in farms in 1900	622,700
Woodland in farms	18,756
Other unimproved land	118,447

Value of all Farm Property.

Total in 1910	$43,787,887
Total value in 1900	17,031,950
Per cent increase 1900-1910	157.1
Land in 1910	35,324,713
Land in 1900	13,674,850
Buildings in 1910	3,320,475
Buildings in 1900	1,237,900
Implements and machinery in 1910	820,079
Implements and machinery in 1900	537,280
Domestic animals, poultry, and bees in 1910	4,323,090
Domestic animals, poultry, and bees in 1900	1,581,920

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	20,678
Other cows	9,047
Yearling heifers	5,294
Calves	7,252
Yearling steers and bulls	2,922
Other steers and bulls	3,765
Total	49,132
Value	*$1,728,698
Horses*—	
Mature horses	11,818
Yearling colts	1,120
Spring colts	619
Total	14,357
Value	*$1,555,290
Mules—	
Mature mules	5,032
Yearling colts	236
Spring colts	174
Total	5,442
Value	$703,567
Asses and burros—	
Number	31
Value	$7,835
Swine—	
Mature hogs	13,610
Spring pigs	9,417
Total	23,027
Value	$158,491

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*Includes animals, age and sex not specified.

STANISLAUS COUNTY SUMMARY—Continued.

Sheep—	
Rams, ewes, and wethers	15,874
Spring lambs	7,378
Total	23,252
Value	$86,005
Goats—	
Number	217
Value	575
Total value all domestic animals	$4,240,461
Poultry and bees—	
Poultry of all kinds	128,905
Value	$74,116
Colonies of bees	2,554
Value	$8,423

Principal Crops.

	Acres	Bushels
Corn	662	12,297
Oats	38,546	688,542
Wheat	22,068	258,121
Barley	57,529	828,628
Kafir corn and milo maize	4,448	80,343
Dry edible beans	373	4,395
Potatoes	207	17,502

Hay and forage—	Acres	Tons
Timothy alone	160	40
Clover alone	10	30
Alfalfa	40,917	149,214
Other tame and cultivated grasses	3,350	2,389
Wild, salt, or prairie grasses	7,400	4,976
Grains cut green	16,847	19,633
All other hay and forage	748	2,361
Totals	69,432	178,643

Poultry products—	
Poultry raised, number	121,677
Eggs produced, dozen	648,248
Value of poultry and eggs produced	$237,685
Honey and wax—	
Honey produced, pounds	61,592
Wax produced, pounds	1,371
Value of honey and wax produced	$5,160
Wool—	
Wool, fleeces shorn	22,837
Mohair and goat hair, fleeces shorn	50
Value wool and mohair produced	$22,700
Special crops—	
Potatoes, acres	207
Sweet potatoes, acres	1,647
All other vegetables, acres	1,621

Orchard fruits—	Number bearing trees
Apples	3,680
Apricots	20,451
Cherries	1,182
Peaches and nectarines	154,553
Pears	4,158
Prunes and plums	6,095
Total	190,515

Tropical fruits—	Number bearing trees
Figs	37,676
Lemons	576
Oranges	10,492
Pomeloes	18
Olives	5,458
Total	54,291

Grapevines—	
Number in bearing	1,932,302
Small fruits—	
Strawberries, acres	95
Blackberries and dewberries, acres	53
All others, acres	13
Total	161

Nuts—	Number bearing trees
Almonds	33,726
Pecans	25
Walnuts	864
Total	34,701

Irrigation.

Number of farms irrigated in 1909	1,911
Acres irrigated in 1909	84,015
Acreage enterprises were capable of irrigating in 1910	141,785
Acreage included in projects	340,914
Main ditches, number	23
Length, miles	153
Laterals, number	34
Length, miles	274
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$4,051,870
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$28.58

Mineral Production in 1914.

	Amount	Value
Brick, thousand	250	$2,500
Gold*	-----	---------
Mineral paint, tons	52	286
Miscellaneous stone	-----	3,096
Silver*	-----	---------
Total		$5,882
Number of mineral springs		2

*Combined with Merced.

SUTTER COUNTY.

Date of creation, February 18, 1850.

Land area, 608 square miles.
County seat, Yuba City, town.
Population per square mile, 10.4.

	1890	1900	1910
Population	5,469	5,886	6,328
Population	-----	-----	1,160

Elevation, 57 feet.

	Highest	Lowest		Inches		Inches
1915: Temperature	101	20	Rainfall	27.90	Snow	0

Almost in the center of the far-famed valley of the Sacramento is located the county of Sutter, the larger portion of which lies between the Sacramento and Feather rivers directly at their confluence. The remaining portion of the county lies east of the Feather River, just south of Bear River. Surrounded by rivers on almost every side, it is evident that the soil of the county is largely river made, the wash of a thousand years from the Sierra Nevada and Coast Range mountains, and is deep and fertile, the equal of any in the whole State of California.

The western portion of Sutter County in particular is being rapidly developed. The large land holdings are being cut up and sold out in small tracts. Meridian is a prosperous little town, located in the western portion of the county, as well as Live Oak, in the northern part, and Nicolaus in the southern division.

The dairy industry is thriving, and there are a number of large creameries.

Sutter County is the home of the Thompson seedless grape, which is being grown so extensively in various valleys of the State. Most other fruits are grown with great success.

SUTTER COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	57
10 to 19 acres	101
20 to 49 acres	142
50 to 99 acres	91
100 to 174 acres	123
175 to 259 acres	84
260 to 499 acres	123
500 to 999 acres	78
1,000 acres and over	74
Total	873
Total in 1900	728

Land and Farm Areas.

Approximate land, acres	389,120
Land in farms in 1910	385,462
Land in farms in 1900	293,287
Improved land in farms in 1910	199,510
Improved land in farms in 1900	206,877
Woodland in farms	13,956
Other unimproved land	171,996

Value of all Farm Property.

Total value in 1910	$19,115,593
Total value in 1900	9,182,731
Per cent increase 1900-1910	108.2
Land in 1910	14,869,242
Land in 1900	6,976,320
Buildings in 1910	2,032,535
Buildings in 1900	987,700
Implements and machinery in 1910	458,269
Implements and machinery in 1900	313,780
Domestic animals, poultry, and bees in 1910	1,755,547
Domestic animals, poultry, and bees in 1900	904,931

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	6,728
Other cows	3,254
Yearling heifers	1,939
Calves	2,623
Yearling steers and bulls	1,012
Other steers and bulls	823
Total	16,604
Value	*$465,202
Horses—	
Mature horses	4,839
Yearling colts	587
Spring colts	228
Total	5,684
Value	$573,051

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*Includes animals, age and sex not specified.

SUTTER COUNTY SUMMARY—Continued.

Mules—	
Mature mules	1,922
Yearling colts	107
Spring colts	67
Total	2,096
Value	$272,402
Asses and burros—	
Number	20
Value	$6,670
Swine—	
Mature hogs	9,121
Spring pigs	6,008
Total	15,129
Value	$105,752
Sheep—	
Rams, ewes, and wethers	51,135
Spring lambs	38,530
Total	89,635
Value	$284,023
Goats—	
Number	511
Value	$2,031
Total value all domestic animals	$1,709,131
Poultry and bees—	
Poultry of all kinds	68,861
Value	$38,690
Colonies of bees	2,055
Value	$7,726

Principal Crops.

	Acres	Bushels
Corn	761	22,373
Oats	3,568	56,823
Wheat	14,537	176,750
Barley	27,457	491,720
Kafir corn and milo maize	352	7,750
Dry edible beans	2,766	76,201
Potatoes	218	23,419
Hay and forage—	Acres	Tons
Timothy and clover mixed	80	80
Clover alone	415	2,525
Alfalfa	7,388	21,791
Other tame and cultivated grasses	703	1,003
Wild, salt, or prairie grasses	7,466	9,620
Grains cut green	14,744	20,612
All other hay and forage	1,948	1,986
Total	32,744	57,017

Poultry products—	
Poultry raised, number	101,908
Eggs produced, dozens	420,198
Value of poultry and eggs produced	$167,240
Honey and wax—	
Honey produced, pounds	76,812
Wax produced, pounds	745
Value of honey and wax produced	$4,909

Wool—	
Wool, fleeces shorn	149,821
Mohair and goat hair, fleeces shorn	800
Value wool and mohair produced	$110,738
Special crops—	
Potatoes, acres	218
Sweet potatoes, acres	41
All other vegetables, acres	303
Sugar beets, acres	27
Orchard fruits—	Number bearing trees
Apples	5,433
Apricots	5,086
Cherries	1,249
Peaches and nectarines	149,057
Pears	17,911
Prunes and plums	65,723
Total	244,587
Tropical fruits—	Number bearing trees
Figs	4,675
Lemons	602
Oranges	2,427
Pomeloes	18
Olives	3,018
Total	10,741
Grapevines—	
Number in bearing	1,249,923
Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	7
All others, acres	8
Total	16
Nuts—	Number bearing trees
Almonds	61,572
Pecans	11
Walnuts	671
Total	62,289

Irrigation.

Number of farms irrigated in 1909	39
Acres irrigated in 1909	1,173
Acreage enterprises were capable of irrigating in 1910	1,361
Acreage included in projects	1,959
Main ditches, number	13
Length, miles	6
Pumped wells, number	18
Cost of irrigation enterprises up to July 1, 1910	$18,800
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$13.81

Mineral Production

Sutter shares with Alpine and Yolo counties the distinction of being the only section of the State which had no commercial output of some kind of mineral substance during 1913. Both clay and coal exist here, but deposits of neither mineral have been placed on a productive basis.

TEHAMA COUNTY.

Date of creation, April 9, 1856.

		1890	1900	1910
Land area, 2,893 square miles.	Population	9,916	10,996	11,401
County seat, Red Bluff, city.	Population	2,608	2,750	3,530
Population per square mile, 3.9.				

		Highest	Lowest		Inches		Inches
Elevation, 307 feet.	1915: Temperature	110	28	Rainfall	36.15	Snow	0

Tehama County occupies the upper or northern portion of the Sacramento Valley. It is 200 miles north of San Francisco and 120 miles north of Sacramento. Part of its eastern boundary follows the summit of the Sierra Nevada Mountains, and its western boundary lies along the summit of the Coast Range. Its greatest length is 78 miles; its width from north to south, 38 miles.

The Sacramento River is navigable to Red Bluff and steamboats from San Francisco and Sacramento make trips up and down during most of the year. The Sacramento River runs through the county from north to south. From this river there is a rise to the east and west until the summit of the mountain range is reached. South of Red Bluff and west of the river lie broad plains, beyond this, rolling hills developing into the foothills of the mountains, and then the mountains themselves, which rise quite abruptly to a height of from 3,000 to 9,000 feet.

Tehama County is well watered; numerous creeks carry streams from the mountain snows to the river.

The principal industries are horticulture, agriculture, stock raising, and lumbering. There is practically no mining. A large deposit of chrome ore to the west and valuable sulphur springs to the east are about all.

Olives are fast coming into favor as a crop and as a food. No attempts were made to plant them in quantity until within the past few years.

Peaches are the principal fruit. They are shipped green, and are canned and dried. The bulk of the crop is dried.

Apples are grown only in the foothills. The chief apple-producing region of the county is at Manton, 35 miles to the northeast of Red Bluff where very fine fruit is raised.

Berries and all small fruits do well. They come into the market early and sell readily.

In agriculture there has been a gradual change from the growing of wheat to fruit or other grains. Hay is made from a mixture of wild oats and wheat grown together and cut just when on the point of turning. It is cured on the ground and then stacked.

Sheep raising is easily the favorite branch of the stock business. This is the principal wool-producing county of northern California, and indeed of the State. The favorite breeds of sheep are Spanish Merino, French Merino, Southdown, and Cotswold for wool, and Shropshire more particularly for mutton.

Of late years Angora goats have come into greater favor. They are hardy animals, readily adapting themselves to a mountainous and hilly country which no other animal can occupy. They eat almost anything, can protect themselves from wild animals, and their wool, or mohair, is in demand and brings a good price.

(*Information supplied by the Chamber of Commerce.*)

Hog raising in Tehama County offers wonderful opportunities. This industry has increased 13 per cent since 1910.

Bee keeping shows an increase of 46 per cent in the last five years, and the interest is growing.

Oranges the past year showed a small decrease in quantity but were of a somewhat higher quality than in 1914.

Peaches showed a reverse condition, there being an enormous crop but of inferior quality and consequently a slightly lower price.

The future for olives is very bright. The prices were fair, the production heavy, and 500 acres of nonbearing trees show that the growers are preparing for a larger supply to meet the growing demand.

The dehydrated olive alone will make Tehama County famous wherever olives are known.

Faith in the Tehama County peach and prune grows year by year, there being 700 acres of nonbearing peaches and 600 acres of young prune trees in the county.

The following figures are for the year 1914:

Hay and Grain.

	Acres	Amount	Value
Hay (alfalfa)	9,600	28,000 tons	$230,400
Hay (grain)	44,000	77,000 tons	616,000
Wheat	58,760	1,175,200 bushels	1,057,680
Barley	46,500	930,000 bushels	558,000
Oats	6,875	137,500 bushels	85,500
Hops	625	948,025 pounds	189,605

Live Stock.

	Head	Value
Cattle (dairy)	5,462	$382,340
Cattle (beef)	24,538	1,226,900
Mules	1,560	156,000
Horses	3,869	386,900
Hogs	20,200	161,600
Sheep	300,500	1,000,000
Goats (Angora)	23,980	59,950

TEHAMA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	34
10 to 19 acres	119
20 to 49 acres	198
50 to 99 acres	102
100 to 174 acres	151
175 to 259 acres	51
260 to 499 acres	119
500 to 999 acres	86
1,000 acres and over	139
Total	1,006
Total in 1900	1,055

Land and Farm Areas.

Approximate land, acres	1,851,520
Land in farms in 1910	915,227
Land in farm in 1900	950,763
Improved land in farms in 1910	186,642
Improved land in farms in 1900	269,693
Woodland in farms	206,234
Other unimproved land	522,351

Value of all Farm Property.

Total value in 1910	$16,821,178
Total value in 1900	16,030,104
Per cent increase 1900-1910	4.9
Land in 1910	12,932,446
Land in 1900	11,720,120
Buildings in 1910	1,234,375
Buildings in 1900	2,091,860
Implements and machinery in 1910	494,932
Implements and machinery in 1900	440,020
Domestic animals, poultry, and bees in 1910	2,159,425
Domestic animals, poultry, and bees in 1900	1,778,104

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,462
Other cows	10,691
Yearling heifers	2,646
Calves	3,520
Yearling steers and bulls	2,590
Other steers and bulls	2,400
Total	25,309
Value	$512,747
Horses—	
Mature horses	5,073
Yearling colts	525
Spring colts	278
Total	5,876
Value	$461,472
Mules—	
Mature mules	1,409
Yearling colts	163
Spring colts	103
Total	1,675
Value	$171,979
Asses and burros—	
Number	23
Value	$7,880
Swine—	
Mature hogs	10,915
Spring pigs	4,025
Total	14,940
Value	$75,941
Sheep—	
Rams, ewes, and wethers	185,023
Spring lambs	112,713
Total	297,736
Value	$850,456
Goats—	
Number	28,473
Value	$36,325
Total value all domestic animals	$2,119,800
Poultry and bees—	
Poultry of all kinds	59,852
Value	$37,989
Colonies of bees	786
Value	$1,636

Principal Crops.

	Acres	Bushels
Corn	100	2,613
Oats	1,032	28,138
Wheat	6,090	84,009
Barley	11,402	177,518
Dry edible beans	10	202
Potatoes	112	13,048

Hay and forage—	Acres	Tons
Timothy alone	40	45
Timothy and clover mixed	265	226
Clover alone	52	102
Alfalfa	8,387	28,332
Other tame and cultivated grasses	258	272
Wild, salt, or prairie grasses	2,184	1,844
Grains cut green	13,157	13,218
Totals	24,343	44,039

Poultry products—	
Poultry raised, number	96,134
Eggs produced, dozens	306,452
Value poultry and eggs produced	$149,168
Honey and wax—	
Honey produced, pounds	15,779
Wax produced, pounds	115
Value of honey and wax produced	$1,198
Wool—	
Wool, fleeces shorn	336,373
Mohair and goat hair, fleeces shorn	36,119
Value wool and mohair produced	$349,689

TEHAMA COUNTY SUMMARY—Continued.

Special crops—	
Potatoes, acres	112
Sweet potatoes, acres	30
All other vegetables, acres	292

Orchard fruits—	Number bearing trees
Apples	15,633
Apricots	30,446
Cherries	624
Peaches and nectarines	260,204
Pears	41,584
Prunes and plums	92,459
Total	441,070

Tropical fruits—	Number bearing trees
Figs	3,176
Lemons	356
Oranges	10,744
Pomeloes	5
Olives	17,373
Total	31,654

Grapevines—	
Number in bearing	1,307,218

Small fruits—	
Strawberries, acres	36
Blackberries and dewberries, acres	7
All others, acres	6
Total	49

Nuts—	Number bearing trees
Almonds	32,919
Pecans	10
Walnuts	1,569
Total	34,555

Irrigation.

Number of farms irrigated in 1909	366
Acres irrigated in 1909	14,281
Acreage enterprises were capable of irrigating in 1910	23,167
Acreage included in projects	36,020
Main ditches, number	136
Length, miles	164
Laterals, number	41
Length, miles	40
Flowing wells, number	1
Pumped wells, number	141
Cost of irrigation enterprises up to July 1, 1910	$263,055
Average cost per acre irrigation enterprises were capable of irrigating in 1910	11.35

Mineral Production in 1914.

	Amount	Value
Mineral water, gallons	100	$100
Salt, tons	*1/11	200
Total		$300
Number of mineral springs		11

*From mineral water.

TRINITY COUNTY.

Date of creation, February 18, 1850.

Land area, 3,166 square miles.
County seat, Weaverville, township.
Population per square mile, 1.0.

	1890	1900	1910
Population	3,719	4,383	3,301
Population	768	968	674

Elevation, 2,162 feet. 1915: Temperature—Highest 105, Lowest 9. Rainfall—47.78 Inches. Snow—10.5 Inches.

Trinity County is situated in the Coast Range of mountains and is well drained by the Trinity, Mad, Eel, and Van Duzen rivers, and is well watered by the numerous creeks that carry streams of water from the mountain snows to the rivers and their tributaries. The higher mountain ranges, being covered with snow during the winter season, give ample supply for irrigation, and also provide an abundance of pasturage on the mountains. Trinity is bounded on the north by Siskiyou, on the east by Shasta and Tehama, on the south by Mendocino, and on the west by Humboldt County, thus being on the great mineral belt of the northwestern part of the State. Mining for gold has been the principal industry for fifty years. Hydraulic, placer, drift placer, dredge, and quartz mining have produced profitable results. Many other valuable minerals have been found, but owing to the lack of cheap transportation facilities, none of them has been developed to any extent. With an abundance of sugar pine, yellow pine, and fir timber ready for the market, the lumbering interests will be extensive as soon as railroad transportation is provided.

TRINITY COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	9
10 to 19 acres	9
20 to 49 acres	24
50 to 99 acres	23
100 to 174 acres	148
175 to 259 acres	23
260 to 499 acres	41
500 to 999 acres	15
1,000 acres and over	10
Total	308
Total in 1900	272

Land and Farm Areas.

Approximate land, acres	2,026,240
Land in farms in 1910	91,310
Land in farms in 1900	76,038
Improved land in farms in 1910	13,300
Improved land in farms in 1900	14,144
Woodland in farms	31,882
Other unimproved land	46,128

Value of all Farm Property.

Total value in 1910	$1,591,469
Total value in 1900	1,040,819
Per cent increase 1900-1910	52.9
Land in 1910	900,855
Land in 1900	583,450
Buildings in 1910	274,260
Buildings in 1900	171,550
Implements and machinery in 1910	69,119
Implements and machinery in 1900	31,180
Domestic animals, poultry, and bees in 1910	347,235
Domestic animals, poultry, and bees in 1900	254,639

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	804
Other cows	5,143
Yearling heifers	1,415
Calves	1,126
Yearling steers and bulls	1,308
Other steers and bulls	2,089
Total	11,885
Value	$211,324
Horses—	
Mature horses	1,150
Yearling colts	117
Spring colts	39
Total	1,306
Value	$90,724
Mules—	
Mature mules	142
Yearling colts	19
Spring colts	7
Total	168
Value	$9,985

TRINITY COUNTY SUMMARY—Continued.

Asses and burros—	
Number	8
Value	$670
Swine—	
Mature hogs	2,591
Spring pigs	1,457
Total	4,051
Value	$17,281
Sheep—	
Rams, ewes, and wethers	2,732
Spring lambs	1,081
Total	3,813
Value	$10,486
Goats—	
Number	845
Value	$1,619
Total value all domestic animals	$342,089
Poultry and bees—	
Poultry of all kinds	7,712
Value	$4,729
Colonies of bees	98
Value	$417

Principal Crops.

	Acres	Bushels
Corn	51	1,833
Oats	150	2,667
Wheat	377	5,274
Barley	39	1,210
Dry edible beans	4	275
Potatoes	143	20,467
Hay and forage—	Acres	Tons
Timothy alone	266	550
Timothy and clover mixed	1,519	2,974
Clover alone	135	251
Alfalfa	1,115	2,632
Other tame and cultivated grasses	33	46
Wild, salt, or prairie grasses	578	690
Grains cut green	1,665	1,765
All other hay and forage	9	21
Total	5,350	8,929

Poultry products—	
Poultry raised, number	10,800
Eggs produced, dozens	31,776
Value poultry and eggs produced	$15,957
Honey and wax—	
Honey produced, pounds	1,005
Wax produced, pounds	15
Value honey and wax produced	$207
Wool—	
Wool, fleeces shorn	2,603
Mohair and goat hair, fleeces shorn	44
Value wool and mohair produced	$1,892

Special crops—	
Potatoes, acres	143
All other vegetables, acres	192
Orchard fruits—	Number bearing trees
Apples	4,272
Apricots	41
Cherries	247
Peaches and nectarines	886
Pears	738
Prunes and plums	1,083
Total	7,313
Tropical fruits—	Number bearing trees
Figs	20
Lemons	2
Total	22
Grapevines—	
Number in bearing	2,842
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	5
All others, acres	5
Total	15
Nuts—	Number bearing trees
Almonds	30
Pecans	1
Walnuts	58
Total	91

Irrigation.

Number of farms irrigated in 1909	201
Acres irrigated in 1909	6,324
Acreage enterprises were capable of irrigating in 1910	7,127
Acreage included in projects	9,513
Main ditches, number	208
Length, miles	228
Laterals, number	41
Length, miles	13
Pumped wells, number	1
Cost of irrigation enterprises up to July 1, 1910	$173,414
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$24.33

Mineral Production in 1914.

	Value
Gold	$750,000
Mineral water	245
Silver	3,500
Total	$753,745
Number of mineral springs	4

TULARE COUNTY.

Date of creation, April 20, 1852.

		1890	1900	1910
Land area, 4,856 square miles.	Population	24,574	18,375	35,440
County seat, Visalia, city.	Population	2,885	3,085	4,550
Population per square mile, 7.3.				

Porterville (Station):		Highest	Lowest		Inches		Inches
Elevation, 464 feet.	1915: Temperature	111	28	Rainfall	13.33	Snow	T.

Tulare County is one of the largest counties of the great San Joaquin Valley, extending from the Sierra Nevada Mountains on the east to the Coast Range on the west, embracing a territory from 75 miles to 100 miles in width. The valley sweeps southward 250 miles to where the Tehachapi Mountains intersect with the Sierra and Coast ranges, forming the line between the so-called northern and southern California.

About one-half of the county is mountainous. Its eastern boundary, commencing at the crest of the Sierra, embraces Mount Whitney, whose hoary head reaches an altitude of 4,504 feet and is the highest summit in the United States. Out of these mountains flow many streams that furnish water to irrigate the level and fertile acres.

Wheat and small grains are grown without irrigation. Tulare County was at one time the banner wheat county, some individuals sowing five, ten, and twenty thousand acres, but farming on that scale is rapidly passing away. Still there are many thousand acres sown to wheat annually.

The principal agricultural products of Tulare County are wheat, barley, alfalfa, sugar beets, and Egyptian corn. The sugar beet factory at Visalia harvested 1,640 acres of beets in 1914, producing 8,536 tons of beets and 2,112,100 pounds of sugar.

Tulare County produces large quantities of peaches and prunes, also pears, apricots, apples, olives, figs, plums, almonds, walnuts, raisins, table and wine grapes, oranges, lemons, and berries of all kinds. The citrus orchards in the districts around Exeter, Tulare, Porterville, and Lindsay are the largest and most successful in northern California. Up to April 2, 1915, Tulare County shipped 5,172 carloads of oranges and 180 of lemons.

Some of the largest raisin vineyards are to be found in Tulare County. The Muscat, Seedless Sultana, and Thompson's Seedless are the principal varieties grown. In the vicinity of Dinuba, Orosi, and Sultana this industry is especially flourishing.

The Kaweah is the largest river.

About 50 miles northeast of Visalia lies the Sequoia National Park, a reservation by the Government of the largest forest of *Sequoia gigantea* trees in existence. The reservation contains about 250 square miles. There are more than 3,000 sequoias in this forest that measure over 45 feet in circumference and 300 feet in height. The General Sherman in this forest is said to be the largest living tree in the United States. Over 100 feet from its base it is 80 feet in circumference.

TULARE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	9
3 to 9 acres	171
10 to 19 acres	390
20 to 49 acres	1,247
50 to 99 acres	647
100 to 174 acres	597
175 to 259 acres	198
260 to 499 acres	364
500 to 999 acres	197
1,000 acres and over	201
Total	4,021
Total in 1900	2,212

Land and Farm Areas.

Approximate land, acres	3,107,840
Land in farms in 1910	1,045,231
Land in farms in 1900	1,059,727
Improved land in farms in 1910	507,024
Improved land in farms in 1900	546,289
Woodland in farms	161,360
Other unimproved land	376,847

Value of all Farm Property.

Total value in 1910	$76,539,642
Total value in 1900	20,287,801
Per cent increase 1900-1910	277.3
Land in 1910	$64,455,554
Land in 1900	15,898,600
Buildings in 1910	4,195,452
Buildings in 1900	1,376,960
Implements and machinery in 1910	1,805,419
Implements and machinery in 1900	715,450
Domestic animals, poultry, and bees in 1910	6,083,217
Domestic animals, poultry, and bees in 1900	2,296,791

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	26,765
Other cows	29,478
Yearling heifers	11,911
Calves	16,092
Yearling steers and bulls	8,784
Other steers and bulls	10,429
Total	104,484
Value	*$2,713,596
Horses*—	
Mature horses	18,917
Yearling colts	2,003
Spring colts	1,250
Total	22,200
Value	*$2,334,909
Mules—	
Mature mules	3,149
Yearling colts	288
Spring colts	218
Total	3,655
Value	$491,410
Asses and burros—	
Number	103
Value	$20,534
Swine—	
Mature hogs	23,942
Spring pigs	14,250
Total	38,192
Value	$301,227
Sheep—	
Rams, ewes, and wethers	14,014
Spring lambs	7,170
Total	21,184
Value	$79,930
Goats—	
Number	297
Value	$8,632
Total value all domestic animals	$5,950,238
Poultry and bees—	
Poultry of all kinds	191,965
Value	$102,352
Colonies of bees	9,568
Value	$30,627

Principal Crops.

	Acres	Bushels
Corn	2,527	61,757
Oats	1,281	25,524
Wheat	66,567	761,459
Barley	27,017	553,481
Kafir corn and milo maize	10,987	288,382
Dry edible beans	21	267
Potatoes	677	57,026

Hay and forage—	Acres	Tons
Timothy and clover mixed	35	23
Clover alone	100	250
Alfalfa	37,656	126,316
Other tame and cultivated grasses	546	537
Wild, salt, or prairie grasses	7,158	6,612
Grains cut green	44,822	52,032
All other hay and forage	1,278	3,040
Totals	91,595	188,810

Poultry products—	
Poultry raised, number	204,167
Eggs produced, dozen	1,033,110
Value poultry and eggs produced	$325,658
Honey and wax—	
Honey produced, pounds	290,435
Wax produced, pounds	4,743
Value honey and wax produced	$17,434
Wool—	
Wool, fleeces shorn	33,150
Mohair and goat hair, fleeces shorn	510
Value wool and mohair produced	$35,218

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*Includes animals, age and sex not specified.

TULARE COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Special crops—	
Potatoes, acres	677
Sweet potatoes, acres	46
All other vegetables, acres	2,550
Sugar beets, acres	1,239

Orchard fruits—	Number bearing trees
Apples	25,261
Apricots	48,834
Cherries	316
Peaches and nectarines	714,494
Pears	6,483
Prunes and plums	264,337
Total	1,059,830

Tropical fruits—	Number bearing trees
Figs	15,750
Lemons	41,069
Oranges	801,151
Pomeloes	8,114
Olives	5,605
Total	872,657

Grapevines—	
Number in bearing	7,227,491

Small fruits—	
Strawberries, acres	19
Blackberries and dewberries, acres	70
All others, acres	30
Total	119

Nuts—	Number bearing trees
Almonds	1,977
Pecans	26
Walnuts	1,942
Total	3,945

Irrigation.

Number of farms irrigated in 1909	3,048
Acres irrigated in 1909	265,404
Acreage enterprises were capable of irrigating in 1910	337,938
Acreage included in projects	466,735
Main ditches, number	752
Length, miles	1,033
Laterals, number	577
Length, miles	629
Flowing wells, number	79
Pumped wells, number	794
Cost of irrigation enterprises up to July 1, 1910	$5,634,379
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$16.67

Mineral Production in 1914.

	Amount	Value
Brick, thousand	6,838	$47,507
Feldspar, tons	2,830	13,065
Marble, cubic feet	6	30
Magnesite, tons	9,650	96,500
Miscellaneous stone	-----	1,750
Quartz, tons	1,250	2,400
Total		$161,252
Number of mineral springs		18

NOTE.—In 1899, 96 square miles were transferred to Kings County.

TUOLUMNE COUNTY.

Date of creation, February 18, 1850.

Land area, 2,190 square miles.
County seat, Sonora, city.
Population per square mile, 4.6.

	1890	1900	1910
Population	6,082	11,166	9,979
Population	1,441	1,922	2,029

Jamestown (Station):
Elevation, 1,471 feet.

Tuolumne County is in central California. The eastern portion extends into the western slope of the Sierra Nevada range. The entire surface is of a rugged character, with many small and fertile valleys and meadows, and sloping hills heavily covered with timber.

The main rivers are the Stanislaus and Tuolumne, tributaries of the San Joaquin. The Tuolumne has its source entirely within the limits of the county, and may be termed the river of a thousand lakelets, although a number of these strictly come under the head of lakes. The main, or principal branch of the river flows through the Hetch Hetchy Valley. The Stanislaus River, to the north, with one of its branches, forms the boundary line of this county and Calaveras.

In many places the soil is well adapted to fruit growing.

Stock raising is controlled mostly by feed—by those who have ranges in the mountains for summer and pasturage in the foothills for winter. In the mountains in certain sections there are meadows upon which grows the finest kind of bunch grass, while upon the hillsides wild oats and timothy afford a splendid feed.

(*Information supplied by the County Surveyor.*)

Tuolumne County is located near the center of the State, due east from San Francisco, a distance of 90 miles in an air line, at an altitude, above sea level, ranging from 300 feet in the west to 12,000 feet in the east, the average altitude in the populated portion of the county being about 2,000 feet.

The famous "Mother Lode" series of gold-bearing veins traverses the western portion of the county for a distance of 23 miles, giving employment to hundreds of men who wrest from its depths more than $1,000,000 annually.

The county is also traversed by a system of ancient river channels, containing gold-bearing gravels, which have been covered and filled up with a deposit of volcanic origin. Notably among these is the Table Mountain Channel, which is, at present, being mined at many different points.

West of the Mother Lode there is quite a copper deposit, which awaits development to demonstrate its commercial value and possibilities.

Three miles northwest of Columbia is an immense deposit of marble, which is being extensively quarried by the Columbia Marble Company. It is one of the largest marble quarries in California, and many of the notable buildings in San Francisco and throughout the State furnish proof of its quality and beauty. The annual output of marble from this quarry is valued at $50,000.

Limestone is also being quarried at Shaw's Flat, Brown's Flat, and at a point one mile south of Sonora. South of Sonora the limestone is calcined in kilns, and a superior quality of lime is produced. The supply of limestone is practically inexhaustible.

Tuolumne County has also an extensive lumber industry. One company holds 60,000 acres of white pine, sugar pine, fir and cedar, and another holds 42,000 acres of white pine, sugar pine, fir and cedar. Together, they cut annually about 75 million feet. This industry gives employment to about 2,000 men and is one of the principal sources of revenue to the county.

Although the fruit industry is young, its commercial possibilities have been established.

Besides apples other fruits are grown equally as successfully, among them being pears, peaches, grapes, plums, etc.

Vegetable gardens, with almost every known vegetable, are in evidence in every community and commercially have proven a great success.

In Tuolumne County another important industry is that of stock or cattle raising, the cattlemen being among the wealthiest citizens. Here every opportunity and advantage presents itself, there being abundance of range, feed and water. During the winter months the cattle graze in the foothill ranges and in the summer they are driven to the mountains, where they pasture and grow fat in the rich meadows and hillsides of the mountains within the forest reservation. They are shipped direct, by rail, from Sonora to market in carloads.

For irrigation and development of power there is an abundant supply of water, for Tuolumne County embraces the larger portions of the watersheds of the Stanislaus and Tuolumne rivers—the principal tributaries of the San Joaquin River. In fact, it is from this county that the city of San Francisco expects, in the future, to obtain its water supply, and active operations have already begun for that purpose.

The hydroelectric plant of the Sierra and San Francisco Power Company, located here, supplies the electric power for the street car system in San Francisco and many of the mines in this county.

The splendid system of state highways is being extended into this county, the construction work being already completed as far as Sonora, the county seat.

The county has also acquired and turned over to the State the Big Oak Flat scenic route to the Yosemite Valley, and a more interesting trip than one by this route to the Yosemite, can not be had.

TUOLUMNE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	4
10 to 19 acres	15
20 to 49 acres	28
50 to 99 acres	27
100 to 174 acres	105
175 to 259 acres	35
260 to 499 acres	88
500 to 999 acres	43
1,000 acres and over	40
Total	386
Total in 1900	457

Land and Farm Areas.

Approximate land, acres	1,401,600
Land in farms in 1910	193,072
Land in farms in 1900	204,758
Improved land in farms in 1910	36,407
Improved land in farms in 1900	36,461
Woodland in farms	62,215
Other unimproved land	94,450

Value of all Farm Property.

Total value in 1910	$2,942,322
Total value in 1900	2,131,145
Per cent increase 1900-1910	38.1
Land in 1910	1,779,470
Land in 1900	1,284,260
Buildings in 1910	451,955
Buildings in 1900	397,856
Implements and machinery in 1910	114,830
Implements and machinery in 1900	102,670
Domestic animals, poultry, and bees in 1910	596,067
Domestic animals, poultry, and bees in 1900	346,965

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	1,773
Other cows	8,415
Yearling heifers	2,040
Calves	2,977
Yearling steers and bulls	1,531
Other steers and bulls	1,223
Total	18,659
Value	*$377,606
Horses—	
Mature horses	2,053
Yearling colts	242
Spring colts	196
Total	2,491
Value	$165,930
Mules—	
Mature mules	76
Yearling colts	7
Spring colts	8
Total	91
Value	$7,055
Asses and burros—	
Number	26
Value	$1,155
Swine—	
Mature hogs	2,590
Spring pigs	1,303
Total	3,893
Value	$21,620
Sheep—	
Rams, ewes, and wethers	1,795
Spring lambs	671
Total	2,466
Value	$8,658
Goats—	
Number	1,609
Value	$3,868
Total value all domestic animals	$585,892
Poultry and bees—	
Poultry of all kinds	15,989
Value	$9,114
Colonies of bees	363
Value	$1,061

Principal Crops.

	Acres	Bushels
Corn	7	156
Oats	425	7,447
Wheat	277	5,373
Barley	579	5,055
Dry edible beans	3	61
Potatoes	114	18,808

Hay and forage—	Acres	Tons
Timothy alone	12	18
Timothy and clover mixed	128	152
Clover alone	110	218
Alfalfa	145	475
Other tame and cultivated grasses	254	264
Wild, salt, or prairie grasses	1,740	1,636
Grains cut green	6,224	6,799
All other hay and forage	11	22
Totals	8,624	9,584

Poultry products—	
Poultry raised, number	22,710
Eggs produced, dozen	94,507
Value poultry and eggs produced	$36,457
Honey and wax—	
Honey produced, pounds	12,310
Wax produced, pounds	65
Value of honey and wax produced	$879
Wool—	
Wool, fleeces shorn	1,408
Mohair and goat hair, fleeces shorn	177
Value wool and mohair produced	$996

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*Includes animals, age and sex not specified.

TUOLUMNE COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Special crops—	
Potatoes, acres	114
Sweet potatoes, acres	2
All other vegetables, acres	232

Orchard fruits—	Number bearing trees
Apples	13,544
Apricots	162
Cherries	144
Peaches and nectarines	3,065
Pears	1,056
Prunes and plums	1,404
Total	19,554

Tropical fruits—	Number bearing trees
Figs	237
Lemons	6
Oranges	114
Olives	10
Total	367

Grapevines—	
Number in bearing	95,811

Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	8
All others, acres	6
Total	19

Nuts—	Number bearing trees
Almonds	54
Pecans	1
Walnuts	175
Total	230

Irrigation.

Number of farms irrigated in 1909	157
Acres irrigated in 1909	2,035
Acreage enterprises were capable of irrigating in 1910	2,083
Acreage included in projects	5,958
Main ditches, number	62
Length, miles	153
Laterals, number	11
Length, miles	24
Flowing wells, number	2
Pumped wells, number	4
Cost of irrigation enterprises up to July 1, 1910	$180,474
Average cost per acre irrigation enterprises were capable of irrigating in 1910	86.64

Mineral Production in 1914.

	Amount	Value
Copper, pounds	45	$6
Gold	-----	950,000
Lead, pounds	89	3
Lime, barrels	63,331	38,000
Limestone, tons	16,707	21,907
Marble, cubic feet	21,830	38,202
Silver	-----	11,000
Total		$1,059,118
Number of mineral springs		1

VENTURA COUNTY.

Date of creation, March 22, 1872.

Land area, 1,878 square miles.
County seat, Ventura, city.
Population per square mile, 9.8.

	1890	1900	1910
Population	10,071	14,367	18,347
Population	2,320	2,470	2,945

Ojai Valley (Station):		Highest	Lowest		Inches		Inches
Elevation, 900 feet.	1915: Temperature	104	25	Rainfall	23.56	Snow	0

Of Ventura County's 1,878 square miles, less than one-fourth is under cultivation. Back from the coast in all directions rise rugged mountain ranges, whose hearts are pierced in every direction with canyons and valleys of varying lengths. The entire northern section of the county is mountainous, but between the ranges here and there are to be found little valleys, whose soil is most productive. These two rivers, the Santa Clara and the San Buenaventura, rise in these northern mountains, their sources being separated but a few miles. The Piru River, the Sespe, and the Santa Paula River, each of considerable length from its winding through the mountain gorges and canyons, flow into and form the Santa Clara River, which enters the county on the southeastern border, and flows in a generally western direction straight across to the sea.

The narrow stretch of coast from southern Santa Barbara County, through Ventura County and including the northern portion of Los Angeles County, is the great lima bean section. The culture of sugar beets supports the Oxnard sugar factory.

Information supplied by the Ventura Chamber of Commerce.

Ventura County, one of the group of eight of the southernmost counties of the State, lies between Santa Barbara County on the west and Los Angeles County on the east and extends from a 50-mile front on the shores of the Pacific Ocean (Santa Barbara Channel), north to the summit of the Coast Range mountains (Kern County line).

Its southern half is mainly under cultivation. In its northern portion, situated in the foothills of the Coast Range, are many valleys occupied and organized into (four) school districts.

Its principal streams are the Santa Clara River, having its source in the Coast Range and flowing across the county in a western direction and entering the sea about five miles south of the county seat; this is fed by large lateral streams of considerable length, known as the San Francisquito, Casitas, Piru, Sespe and the Santa Paula rivers. The San Buenaventura River, flowing southerly from the foothills, with San Antonio Creek of the Ojai Valley as a feeder, enters the sea at Ventura; also the Cuyama River, with its source and many lateral streams, situated in the northwest quarter of the county, flowing westerly.

Every variety of plant life does well in this county. It produces more lima beans than any other county in the State; upwards of 15,000 acres are cultivated to sugar beets, supporting the Oxnard sugar factory; the apricot, walnut, lemon and orange are some of the major products of the county.

VENTURA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	13
3 to 9 acres	87
10 to 19 acres	120
20 to 49 acres	199
50 to 99 acres	214
100 to 174 acres	207
175 to 259 acres	142
260 to 499 acres	155
500 to 999 acres	90
1,000 acres and over	66
Total	1,293
Total in 1900	1,269

Land and Farm Areas.

Approximate land, acres	1,201,920
Land in farms in 1910	550,199
Land in farms in 1900	552,359
Improved land in farms in 1910	213,868
Improved land in farms in 1900	174,419
Woodland in farms	56,061
Other unimproved land	280,270

Value of all Farm Property.

Total value in 1910	$48,262,645
Total value in 1900	21,433,487
Per cent increase 1900-1910	125.2
Land in 1910	$41,826,120
Land in 1900	18,549,290
Buildings in 1910	2,365,140
Buildings in 1900	1,491,250
Implements and machinery in 1910	1,112,812
Implements and machinery in 1900	482,270
Domestic animals, poultry, and bees in 1910	2,958,573
Domestic animals, poultry, and bees in 1900	910,677

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	2,666
Other cows	5,887
Yearling heifers	2,139
Calves	2,442
Yearling steers and bulls	2,095
Other steers and bulls	10,850
Total	29,929
Value	*$704,498
Horses*—	
Mature horses	9,955
Yearling colts	906
Spring colts	589
Total	11,480
Value	*$1,497,792
Mules—	
Mature mules	2,250
Yearling colts	66
Spring colts	46
Total	2,362
Value	$407,950
Asses and burros—	
Number	60
Value	$10,310
Swine—	
Mature hogs	6,984
Spring pigs	3,514
Total	10,498
Value	$87,633
Sheep—	
Rams, ewes, and wethers	16,113
Spring lambs	15,658
Total	31,771
Value	$119,783
Goats—	
Number	621
Value	$1,273
Total value all domestic animals	$2,826,239
Poultry and bees—	
Poultry of all kinds	60,921
Value	$34,216
Colonies of bees	23,714
Value	$98,118

Principal Crops.

	Acres	Bushels
Corn	2,409	58,995
Oats	1,138	27,901
Wheat	2,896	67,366
Barley	10,077	309,682
Dry edible beans	58,744	1,313,156
Potatoes	264	30,124

Hay and forage—	Acres	Tons
Clover alone	30	100
Alfalfa	1,952	6,960
Other tame and cultivated grasses	23	41
Wild, salt, or prairie grasses	20	40
Grains cut green	49,044	70,193
All other hay and forage	477	1,589
Totals	51,546	78,926

Poultry products—	
Poultry raised, number	61,703
Eggs produced, dozen	372,111
Value poultry and eggs produced	$124,710
Honey and wax—	
Honey produced, pounds	1,839,986
Wax produced, pounds	20,918
Value honey and wax produced	$109,785
Wool—	
Wool, fleeces shorn	21,465
Mohair and goat hair, fleeces shorn	400
Value wool and mohair produced	$14,306

---

*Includes animals, age and sex not specified.

VENTURA COUNTY SUMMARY—Continued.

Special crops—	
Potatoes, acres	264
Sweet potatoes, acres	10
All other vegetables, acres	588
Sugar beets, acres	14,333

Orchard fruits—	Number bearing trees
Apples	15,179
Apricots	219,836
Cherries	392
Peaches and nectarines	8,943
Pears	2,597
Prunes and plums	12,541
Total	259,682

Tropical fruits—	Number bearing trees
Figs	618
Lemons	95,018
Oranges	131,681
Pomeloes	392
Olives	25,961
Total	253,754

Grapevines—	
Number in bearing	36,398

Small fruits—	
Strawberries, acres	14
Blackberries and dewberries, acres	7
All others, acres	10
Total	31

Nuts—	Number bearing trees
Almonds	12,057
Pecans	301
Walnuts	98,622
Total	110,984

Irrigation.

Number of farms irrigated in 1909	489
Acres irrigated in 1909	25,273
Acreage enterprises were capable of irrigating in 1910	49,407
Acreage included in projects	56,357
Main ditches, number	148
Length, miles	177
Laterals, number	53
Length, miles	87
Flowing wells, number	32
Pumped wells, number	157
Cost of irrigating enterprises up to July 1, 1910	$2,262,205
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$45.79

Mineral Production in 1914.

	Amount	Value
Brick, thousand	449	$3,102
Natural gas, cubic feet	100,000	6,000
Petroleum, barrels	943,929	991,125
Sandstone, cubic feet	1,195	502
Total		$1,000,729
Number of mineral springs		9

YOLO COUNTY.

Date of creation, February 18, 1850.

Land area, 1,014 square miles.
County seat, Woodland, city.
Population per square mile, 13.7.

	1890	1900	1910
Population	12,684	13,618	13,926
Population	3,069	2,886	3,187

Davis (Station):		Highest	Lowest		Inches		Inches
Elevation, 51 feet.	1915: Temperature	112	22	Rainfall	21.02	Snow	0

Yolo County is situated in a delta of the Sacramento River, where it changes from a southerly to a westerly course on its way to the Pacific. About 75 per cent of the county consists of level land, the balance being rolling hills and mountains. The principal pursuits of its inhabitants are farming, stock raising, and fruit growing.

Hops are produced along the river bottoms. There is a considerable acreage in barley and wheat, and in fruits, apricots, peaches, and prunes are the leading crops.

Eucalyptus trees have been planted upon 1,790 acres. These trees, of which 320 acres are two years old, show a marvelous growth and bid fair to add great value to our forest products. The former value of land where these trees are now planted has increased fivefold. This industry is in its infancy, but is receiving much attention, as an increased acreage will be planted.

Yolo County boasts one of the best equipped flour mills in the State.

The poultry industry is growing yearly.

The county has a navigable river front of 90 miles along the Sacramento River, which affords at all seasons a cheap and ready means of transportation for the numerous products grown along its banks.

The reclamation of overflowed lands (which are very fertile) grows apace with other developments. Many large tracts have either been reclaimed, or are in course of reclamation.

At Davis, upon 685 acres of very fertile land, is located the State Agricultural Farm, which is affiliated with the State University, and which is presided over by competent professors, who instruct in various branches of agriculture, dairying, etc. This college is very popular, and its courses are being taken advantage of by very many students.

Yolo is one of the two counties in California that produces no minerals, the other being Sutter County.

YOLO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	4
3 to 9 acres	53
10 to 19 acres	115
20 to 49 acres	283
50 to 99 acres	166
100 to 174 acres	170
175 to 259 acres	83
260 to 499 acres	189
500 to 999 acres	107
1,000 acres and over	85
Total	1,255
Total in 1900	1,214

Land and Farm Areas.

Approximate land, acres	648,960
Land in farms in 1910	463,383
Land in farms in 1900	552,065
Improved land in farms in 1910	317,268
Improved land in farms in 1900	351,213
Woodland in farms	77,576
Other unimproved land	68,539

Value of all Farm Property.

Total value in 1910	$31,798,096
Total value in 1900	19,989,751
Per cent increase 1900-1910	59.1
Land in 1910	25,684,710
Land in 1900	15,906,280
Buildings in 1910	2,799,277
Buildings in 1900	1,935,590
Implements and machinery in 1910	795,162
Implements and machinery in 1900	510,430
Domestic animals, poultry, and bees in 1910	2,518,947
Domestic animals, poultry, and bees in 1900	1,637,451

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	7,197
Other cows	3,761
Yearling heifers	2,654
Calves	2,649
Yearling steers and bulls	1,194
Other steers and bulls	1,522
Total	18,977
Value	$553,417
Horses—	
Mature horses	7,127
Yearling colts	814
Spring colts	374
Total	8,315
Value	$907,487
Mules—	
Mature mules	3,501
Yearling colts	265
Spring colts	189
Total	3,955
Value	$555,410
Asses and burros—	
Number	46
Value	$10,480
Swine—	
Mature hogs	15,483
Spring pigs	8,714
Total	24,197
Value	$152,155
Sheep—	
Rams, ewes, and wethers	49,807
Spring lambs	29,639
Total	79,446
Value	$284,627
Goats—	
Number	716
Value	$1,552
Total value all domestic animals	$2,465,128
Poultry and bees—	
Poultry of all kinds	76,972
Value	$43,326
Colonies of bees	2,442
Value	$10,472

Principal Crops.

	Acres	Bushels
Corn	201	5,123
Oats	515	12,365
Wheat	13,452	237,593
Barley	49,530	1,236,884
Kafir corn and milo maize	21	710
Dry edible beans	1,820	50,974
Potatoes	402	45,493

Hay and forage—	Acres	Tons
Clover alone	326	1,030
Alfalfa	16,496	66,110
Other tame and cultivated grasses	3,927	5,323
Wild, salt, or prairie grasses	534	740
Grains cut green	24,479	31,106
All other hay and forage	97	424
Totals	45,859	104,733

Poultry products—	
Poultry raised, number	84,010
Eggs produced, dozen	347,209
Value poultry and eggs produced	$131,892
Honey and wax—	
Honey produced, pounds	106,982
Wax produced, pounds	1,125
Value of honey and wax produced	$8,313
Wool—	
Wool, fleeces shorn	82,602
Mohair and goat hair, fleeces shorn	316
Value wool and mohair produced	$76,497

YOLO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Special crops—	
Potatoes, acres	402
Sweet potatoes, acres	31
All other vegetables, acres	1,086
Sugar beets, acres	5,714

Orchard fruits—	Number bearing trees
Apples	2,512
Apricots	117,228
Cherries	4,534
Peaches and nectarines	116,003
Pears	38,115
Prunes and plums	119,193
Total	397,748

Tropical fruits—	Number bearing trees
Figs	10,476
Lemons	183
Oranges	2,371
Pomeloes	1,325
Olives	4,482
Total	18,858

Grapevines—	
Number in bearing	2,568,019

Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	6
All others, acres	3
Total	10

Nuts—	Number bearing trees
Almonds	149,019
Pecans	9
Walnuts	1,270
Total	150,822

Irrigation.

Number of farms irrigated in 1909	333
Acres irrigated in 1909	11,754
Acreage enterprises were capable of irrigating in 1910	14,697
Acreage included in projects	55,967
Main ditches, number	8
Length, miles	87
Laterals, number	8
Length, miles	83
Pumped wells, number	58
Cost of irrigation enterprises up to July 1, 1910	$311,660
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$21.21

MINERALS.

The mineral production from Yolo County during the year 1914 consisted of 15 flasks of quicksilver, valued at $736, ranking it in fifty-fourth place. Deposits of undetermined value of iron and sandstone have been discovered within the confines of this county.

YUBA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 639 square miles.	Population	9,636	8,620	10,042
County seat, Marysville, city.	Population	3,991	3,497	5,430
Population per square mile, 15.7.				

		Highest	Lowest		Inches		Inches
Elevation, 67 feet.	1915: Temperature	110	20	Rainfall	27.90	Snow	0

Yuba County is about half valley and half mountains. In the mountainous portion the industries are mining, lumbering, and stock raising. Deciduous fruits of all kinds are also raised with success.

At Hammonton and Marigold, on the Yuba River, dredge mining is carried on extensively. The machines are in operation day and night. Many important quartz mines are operated. The Feather River forms most of the western boundary. This stream is the second largest watercourse in the Sacramento Valley, and is navigable as far up as Marysville. Bear River is the southern boundary of the county. The Yuba River passes through the county about midway. These rivers are never failing in water supply. Subterranean water is available in most parts of the county. There are two irrigation districts that take water from the Yuba River.

The county has at Wheatland probably the largest hop fields in California. The production of gold ranks fourth among the counties of the State. Farm crops are not large, wheat having the largest acreage, and in fruits, pears and peaches take the lead. Within the last few years rice has been grown successfully, the area in 1915 amounting to 1,990 acres.

Much of the desirable area of the county is practically undeveloped.

YUBA COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	13
10 to 19 acres	20
20 to 49 acres	33
50 to 99 acres	34
100 to 174 acres	82
175 to 259 acres	30
260 to 499 acres	93
500 to 999 acres	64
1,000 acres and over	67
Total	436
Total in 1900	483

Land and Farm Areas.

Approximate land, acres	408,960
Land in farms in 1910	249,108
Land in farms in 1900	312,321
Improved land in farms in 1910	94,250
Improved land in farms in 1900	154,013
Woodland in farms	70,175
Other unimproved land	84,683

Value of all Farm Property.

Total value in 1910	$6,666,211
Total value in 1900	4,703,613
Per cent increase 1900-1910	41.7
Land in 1910	4,911,611
Land in 1900	3,375,150
Buildings in 1910	688,565
Buildings in 1900	637,130
Implements and machinery in 1910	171,735
Implements and machinery in 1900	151,650
Domestic animals, poultry, and bees in 1910	894,300
Domestic animals, poultry, and bees in 1900	539,683

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,255
Other cows	4,773
Yearling heifers	1,628
Calves	1,827
Yearling steers and bulls	1,152
Other steers and bulls	1,959
Total	13,594
Value	$276,046
Horses—	
Mature horses	2,803
Yearling colts	288
Spring colts	153
Total	3,244
Value	$278,764

YUBA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	726
Yearling colts	48
Spring colts	26
Total	800
Value	$78,900
Asses and burros—	
Number	31
Value	$3,515
Swine—	
Mature swine	3,288
Spring pigs	2,251
Total	5,539
Value	$32,101
Sheep—	
Rams, ewes, and wethers	40,344
Spring lambs	27,318
Total	67,662
Value	$204,939
Goats—	
Number	502
Value	$964
Total value all domestic animals	$875,229
Poultry and bees—	
Poultry of all kinds	27,936
Value	$18,661
Colonies of bees	149
Value	$410

Principal Crops.

	Acres	Bushels
Corn	360	5,645
Oats	1,740	31,834
Wheat	10,376	74,227
Barley	2,801	36,806
Dry edible beans	59	1,112
Potatoes	124	7,698
Hay and forage—	Acres	Tons
Timothy alone	30	40
Timothy and clover mixed	73	160
Clover alone	176	345
Alfalfa	1,798	4,335
Other tame and cultivated grasses	283	698
Wild, salt, or prairie grasses	3,097	2,421
Grains cut green	11,456	10,128
All other hay and forage	97	61
Totals	17,010	18,188

Poultry products—	
Poultry raised, number	44,202
Eggs produced, dozen	111,892
Value poultry and eggs produced	$66,938
Honey and wax—	
Honey produced, pounds	545
Wax produced, pounds	10
Value honey and wax produced	$83
Wool—	
Wool, fleeces shorn	63,383
Mohair and goat hair, fleeces shorn	208
Value wool and mohair produced	$45,777
Special crops—	
Potatoes, acres	124
Sweet potatoes, acres	6
All other vegetables, acres	235

Orchard fruits—	Number bearing trees
Apples	5,468
Apricots	1,481
Cherries	559
Peaches and nectarines	8,744
Pears	10,220
Prunes and plums	3,487
Total	30,264

Tropical fruits—	Number bearing trees
Figs	3,159
Lemons	109
Oranges	1,263
Olives	6,660
Total	11,191

Grapevines—	
Number in bearing	162,751
Small fruits—	
Strawberries, acres	4
Blackberries and dewberries, acres	6
All others, acres	9
Total	19

Nuts—	Number bearing trees
Almonds	3,163
Pecans	6
Walnuts	287
Total	3,458

Irrigation.

Number of farms irrigated in 1909	112
Acres irrigated in 1909	3,073
Acreage enterprises were capable of irrigating in 1910	6,401
Acreage included in projects	46,322
Main ditches, number	36
Length, miles	128
Laterals, number	13
Length, miles	87
Pumped wells, number	11
Cost of irrigation enterprises up to July 1, 1910	$198,268
Average cost per acre irrigation enterprises were capable of irrigating in 1910	30.97

Mineral Production In 1914.

	Value
Gold	$2,800,000
Miscellaneous stone	14,895
Silver	6,000
Total	$2,820,895

NOTE.—The totals given for orchard and tropical fruit trees do not always agree, as some contain a small number of miscellaneous varieties which are not specified, although included in the total.

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STATISTICAL REPORT

OF THE

California
State Board of Agriculture

For the Year 1916

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1917

30810

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REPORT

OF THE

STATE BOARD OF AGRICULTURE.

LETTER OF TRANSMITTAL.

July 1, 1917.

To Honorable WM. D. STEPHENS,

Governor of California.

DEAR SIR: We have the honor to submit herewith the sixty-third annual report of the State Board of Agriculture pertaining to the California State Fair, together with the financial statement of the fiscal year ending June 30, 1917, and the statistical report of the productions of California for the calendar year of 1916.

The State Fair of 1916 was, in many respects, the best in the history of this institution. The attendance was the largest ever attained, the gross receipts being $57,480.92, or approximately $3,000.00 in excess of the best previous record. The displays were on a par with the interest shown by the people generally, and notwithstanding the loss of the principal pavilion by fire, the Fair as a whole was a distinct success. The live stock show filled every available stall and pen and the demand for space in the pavilions taxed the capacity of the establishment. Our manufacturers and producers have learned that the State Fair draws many thousands of prosperous people, affording an opportunity for exploiting their products which can not be secured at any other place or time. The tremendous increase in the number of pure-bred live stock in the state, much of which may be attributed to the influence of the State Fair, is a most gratifying condition, which proves the experience of the great states of the East and Middle West, that fairs are of untold benefit in the development and prosperity of the country.

The 1916 Fair opened on September 2, and the Horticultural Building was destroyed by fire on the evening of September 3. The loss on the building was approximately $75,000, with a very large loss in addition suffered by exhibitors. The legislature has made an appropriation for the erection of a larger and more substantial building and has also arranged for an adjustment of the losses sustained by exhibitors.

Owing to the fire the premiums offered in the Horticulture, Viticulture, Floriculture, Agriculture, Domestic Art and Science and other departments, and for the special county exhibits, were not paid, as many of the exhibitors had lost all or part of their material and would have been discriminated against had awards been given to other exhibitors who had escaped the fire loss. The aggregate amount of premiums offered in these departments was over $7,000 and notwithstanding the reduction in expenditures due to the withholding of these awards the total amount of premiums and prize money paid out for the Fair was but $1,500 less than that paid out for the 1914 State Fair. The figures indicate the degree of success the Fair has attained and the recognition accorded this fact by the producers of the state. This year a still larger showing is anticipated, though it will be necessary to house some very important departments in temporary buildings and under canvas.

Farm Crops.

The year 1916 will long be remembered as a remarkable one by all interested in agriculture owing to the high level of prices attained both for domestic animals and farm products of every description.

The weather of the year was partly favorable and partly unfavorable. Grain crops harvested during 1916 was generally smaller than those of the preceding year, largely on account of deficient rainfall during the spring months. Irrigated crops, particularly fruit, vegetables, rice and cotton, were entirely satisfactory.

Of the most important crops, corn showed a decrease in production, the quantity being 2,048,000 bushels compared with 2,624,000 bushels in 1915, but the average price per bushel on December 1 increased from 88 cents in 1915, to $1.24 per bushel in 1916. Wheat fell off from 7,040,000 bushels in 1915 to 5,600,000 bushels in 1916, but the average price on December 1 was $1.52 compared with 95 cents the previous year. Only a small quantity of rye is grown in the state, the amount being 104,000 bushels compared with 112,000 in 1915, and the price increased from 90 cents per bushel in 1915, to $1.16 per bushel last year. Oats did not vary much in quantity, 6,500,000 bushels being produced against 6,963,000 bushels in 1915, and the average price on December 1 was 72 cents compared with 50 cents the previous year. The quantity of buckwheat grown in the state is quite small.

Barley, which is the most important grain crop in California, decreased from 39,440,000 bushels in 1915 to 33,320,000 bushels in 1916, which, however, was the largest quantity produced by any state in the Union. California has held the first place with few exceptions for many years. The average price per bushel on December 1 was 95 cents compared with 62 cents in 1915.

The potato crop was larger than in 1915, the production being 10,575,000 bushels compared with 10,140,000 the previous year, and the price advanced from 75 cents per bushel in 1915 to $1.40 in 1916. Sweet potatoes are grown to a limited extent compared with many other states, the production shows an increase being 960,000 bushels in 1916, against

810,000 in 1915, and the price advanced from 80 cents per bushel to $1.00 in 1916. Tame hay also increased from 4,230,000 tons in 1915 to 4,375,000 tons in 1916, and the price advanced from $11.20 per ton in 1915 to $12.60 per ton in 1916, as compared with $8.20 per ton in 1914. All the above prices are based on the average farm price on December 1. During the last six months prices have advanced considerably. The estimated farm value per bushel on June 1, 1917, being:

Corn $1.81, wheat $2.65, oats 81 cents, barley $1.29, potatoes $2.75, sweet potatoes $2.71, and hay $17.50 per ton.

The cultivation of rice continues to make great progress, the acreage in 1916 amounting to 65,000 compared with 32,000 the previous year. The quantity of beet sugar produced in the state in 1916 was 549,078,000 pounds or the largest in the history of the industry. The production of cotton continues to increase on a large scale; the acreage in 1916 was 90,000 compared with 40,000 cars in 1915, and the production 55,000 bales compared with 27,000 bales the previous year. Hops are grown principally in Sacramento, Sonoma, and Mendocino counties, and the production was about 118,000 bales of 185 to 190 pounds, an increase of 3,000 bales over the previous year, but owing to low prices a considerable decrease in the acreage is expected the coming season.

The raising of flowers and plants and nursery products is of great importance in California. The acreage in seeds in 1916 amounted to upwards of 16,000 acres, of which several hundred acres were in onion, carrot, lettuce and spinach. Other vegetable seeds cultivated on a smaller scale are parsley, parsnip, chicory, mustard and celery. In Humboldt County large quantities of Dutch bulbs are raised, and in Santa Cruz County lilies, fresias, and other bulbs are grown to a large extent.

Fruit.

Fruit growing continues to expand in nearly all sections of the state.

In the production of apples on the Pacific coast, California ranks second; in 1916, Washington produced 3,225,000 barrels; California, 1,918,000, and Oregon, 1,285,000 barrels.

Figs are annually becoming a more important crop, especially in Fresno County.

Citrus fruits and raisins, which constitute two of the most important crops of the state, did well during the past year. There was a slight increase in lemons, 7,186 carloads being shipped compared with 7,068 in 1915, and a small decrease in oranges from 39,744 carloads in 1915 to 37,897 in 1916. The raisin crop was the largest on record, amounting to upwards of 264,000,000 pounds, compared with 256,000,000 pounds in 1915, and would have been much larger had not an early rain damaged a large quantity.

The date industry at the present time looks very promising; the crop from imported trees in the Coachella Valley was about 12,000 pounds and the crop from seedlings was estimated at 30,000 pounds, which brought very good prices. The avocado is another fruit the cultivation of which has been introduced into California in recent years, and promises to be a popular industry.

Farm Animals.

The number and value of domestic animals does not show such a wide range in changes as do farm crops. The number of horses decreased from 493,000 in 1915 to 468,000 in 1916, and the average value was almost the same, being $96 in 1915 and $97 in 1916. The number of mules remained the same at 70,000, but the value increased from $110 to $116 each.

Milch cows increased from 568,000 in 1915 to 591,000 in 1916, but the value declined from $69 to $67. Other cattle also increased from 1,558,000 in 1915, 1,636,000 in 1916, and the average value advanced from $36.30 in 1915 to $38.10 in 1916. The number of sheep increased from 2,450,000 in 1915 to 2,524,000 in 1916, and the value increased from $5.00 in 1915 to $6.70 in 1916. Swine also increased from 947,000 in 1915 to 994,000 in 1916, and the average value increased from $8.40 in 1915 to $10.10 in 1916.

Value of Farm Land.

The value of farm land in California has consistently increased during the last four years and is today of far higher average value than land in the United States as a whole. The average value per acre of plowed land in California is $55 for the poorer quality and $150, for the good land. In the United States as a whole the average is $42.67 for poor land and $78.34 for good land. The value of land without improvements in California was $70 in 1912 and $110 in 1916. In the United States it was $36.23 in 1912 and $45.55 in 1916. The value of land with improvements in California was $107 in 1912 and $180 in 1916. In the United States it was $57.89 in 1912 and $69.45 in 1916.

Irrigation.

The subject of irrigation is of growing importance, and has attracted much attention during the past year. The law has been improved and consolidated by ''The California Irrigation Act'' passed by the legislature a few months ago, which it is expected will result in greatly extending the organization of water districts, and render the supply of water for irrigation purposes more readily available.

Since the outbreak of the war in Europe, three years ago, the value of the exports, as might be expected, has grown to enormous proportions. In the summary of farm animals, cereal crops, and fruits given in this report, the imports and exports of each have been added, so that the situation can be seen at a glance, and these figures form a very instructive study.

Contrary to general expectations the exports of breadstuffs were considerably less in 1916 than during the previous year, barley, oats, wheat, flour and potatoes all showing a decline. The current year is certain to show a considerable increase, as the supplies sent to the American troops in Europe will alone amount to a very large figure. In the imports the most remarkable figures were for the imports of gold which amounted to the enormous value of $685,990,234, a total which has never been approached before; in 1914 the total was only $57,387,741.

The 1917 State Fair, for which preparations are well under way, promises to mark an epoch in this department of the state's activities. Much meritorious work has been done in the past, but with the incessant demands of the present to support every action of the federal and state authorities, and the prospect of greater usefulness, with increased productions by our people, in the future the State Board of Agriculture will have occasion to be broader in scope and of greater value to the people of the state.

Respectfully submitted.

JOHN M. PERRY,
President.

CHAS. W. PAINE,
Secretary.

FINANCIAL STATEMENT.

July 1, 1916, to June 30, 1917.

SUMMARY.

RECEIPTS.

Balance on hand—State Fair	$8,475.49
Received from appropriations	39,306.57
Exhibit fees	5,110.43
Concessions	5,033.28
Gate receipts, 1916 Fair	53,341.16
Stall rent	927.50
Received on account of races	11,656.49
Refunded expense	1,108.40
Sacramento Chamber of Commerce	3,850.00
Protests	15.00
Motion picture film	75.00
Sale of electric power	635.71
Sale of butter and cheese	295.23
Sale of racing program	121.25
Sale of junk	1,187.27
From live stock associations for special prizes	1,024.16
Rent of tents	200.00
Total	$132,362.94

DISBURSEMENTS.

Directors' traveling expenses	$1,909.11
Salaries	11,225.00
Races	17,429.97
Publicity	6,081.65
Labor	16,590.88
Postage	530.90
Traveling expense	1,048.34
Stable expense	807.71
Expense freight and cartage	663.24
Lights and power	1,345.17
Telephones and telegrams	391.11
Printing and stationery	5,154.35
Expense	9,911.70
Land leases	150.00
Policing grounds	1,004.85
Judges' fees	1,195.30
Refunds	807.85
Premiums	23,141.22
Attractions	15,783.87
Furniture and fixtures	5,398.97
Real estate, buildings and structures	848.45
Revolving fund	1,000.00
Balance on hand State Treasury	9,943.30
Total	$132,362.94

Acts Relating to the Management and Control of the State Agricultural Society.*

Chapter 60—To provide for the management and control of the State Agricultural Society by the state. Approved April 15, 1880.

Chapter 307—An act to amend the above act. Approved June 11, 1913.

Chapter 570—An act to amend the above act. Approved May 29, 1915.

Chapter 677—An act to regulate the public service of stallions and jacks in the state of California. Approved May 1, 1911.

Chapter 584—An act to provide for the collection, compilation and publication of agricultural and other industrial statistics for the state of California, and making an appropriation therefor. Approved April 25, 1911.

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*The California State Agricultural Society was one of the first to be organized, and ranks as fifth in the United States.
Incorporated May 13, 1854.
State Board of Agriculture appointed March 12, 1863.

CHAPTER 60.

An act to provide for the management and control of the state agricultural society by the state.

[Approved April 15, 1880.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. The state agricultural society is hereby declared to be a state institution.

SEC. 2. Within ten days after the passage of this act, the governor shall appoint twelve resident citizens of the state, who shall, when organized constitute a state board of agriculture, who shall, except as hereinafter provided, hold office for the term of four years, and until their successors are appointed and qualified. Vacancies occurring from any cause in the board shall be filled by appointment of the governor for the unexpired term of the office vacated.

SEC. 3. Within ten days after their appointment, the persons so appointed shall qualify, as required by the constitution, and shall meet at the office of the state agricultural society and organize by the election of one of their number as president of the board and said society, who shall hold said office of president for the term of one year, and until his successor is elected and qualified. The board shall also elect a secretary and treasurer, not of their number, who shall each hold office at the discretion of the board.

SEC. 4. At the same meeting, the members of the board shall, by lot or otherwise, classify themselves into four classes of three members each. The terms of office of the first class shall expire at the end of the first fiscal year; of the second class, of the second year; of the third class, of the third year; of the fourth class, at the end of the full term of four years. The fiscal year shall be from the first of February to the first of February.

SEC. 5. The state board of agriculture shall be charged with the exclusive management and control of the state agricultural society as a state institution; shall have possession and care of its property, and be instrusted with the direction of its entire business and financial affairs. They shall define the duties of the secretary and treasurer, fix their bonds and compensation, and shall have power to make all necessary changes in the constitution and rules of the society, to adapt the same to the provisions of this act, and to the management of the society, its meetings and exhibitions. They shall provide for an annual fair or exhibition by the society of all the industries and industrial products of the state, at the city of Sacramento; *provided,* that in no event shall the state be liable for any premium awarded or debt created by said board of agriculture.

SEC. 6. The board shall have power to appoint all necessary marshals and police to keep order and preserve peace at the annual fairs of the society; and the officers so appointed shall be vested with the same authority for the preservation of order and peace, on the grounds and in the buildings of the society, that executive peace officers are vested with by law.

Sec. 7. Said board shall use all suitable means to collect and disseminate all kinds of information calculated to educate and benefit the industrial classes, develop the resources, and advance the material interests of the state, and shall, on or before the first day of February of each year, report to the governor a full and detailed account of their transactions, statistics, and information gained, and also a full financial statement of all funds received and disbursed. They shall also make such suggestions and recommendations as experience and good policy may dictate for the improvement and advancement of the agricultural and kindred industries.

Sec. 8. The superintendent of state printing shall, each year, print and bind in cloth four thousand volumes of said transactions, and deliver the same to said board of agriculture for distribution and exchange. He shall also do such job printing as said board may require to carry out the provisions of this act.

Sec. 9. The directors or boards of managers of each county and district agricultural society or association, and of county, district, or state horticultural and stock breeding association or society, organized, and acting under the laws of this state, shall report annually, on or before the first day of April, to the state board of agriculture, the name and post-office address of each officer of such society or association; and, on or before the first day of December, shall report to said board of agriculture the transactions of said society, including the premiums offered, the list of stock and articles exhibited, and the premiums paid; the amount of receipts and expenditures for the year, the new industries inaugurated, and any and all facts and statistics showing the development and extent of the industries, products, and resources of the county or district embraced within the management of such society or association; *provided,* that the provisions of this act shall not apply to any board of commissioners or other body organized under the laws of this state, the object of which is to promote vinicultural industries, unless such board or body shall voluntarily request the privilege of making such reports as are called for by this act, in which case such board or body shall enjoy equal privileges as are accorded to other institutions devoted to agriculture.

Sec. 10. To facilitate such reports, the state board of agriculture shall have prepared, and shall furnish such societies with necessary schedules and blanks for such reports; said state board shall include such reports from societies and associations, or so much thereof as they may deem advisable, in their report to the governor.

Sec. 11. When said state board of agriculture shall have been organized and classified as provided herein, the secretary of the board shall report such organization and classification to the governor. He shall also report any vacancy that may occur in said board at any time.

Sec. 12. All laws and parts of laws in conflict with this act are hereby repealed.

Sec. 13. This act shall take effect and be in force from and after its passage.

CHAPTER 307.

An act to amend an act entitled "An act to provide for the management and control of the state agricultural society by the state," approved April 15, 1880.

[Approved June 11, 1913.]

The people of the State of California do enact as follows:

SECTION 1. Section five of an act entitled "An act to provide for the management and control of the state agricultural society by the state," approved April 15, 1880, is hereby amended to read as follows:

Section 5. The state board of agriculture shall be charged with the exclusive management and control of the state agricultural society as a state institution; shall have possession and care of its property, and be intrusted with the direction of its entire business and financial affairs. They shall define the duties of the secretary and treasurer, fix their bonds and compensation, and shall have power to make all necessary changes in the constitution and rules of the society; to adapt the same to the provisions of this act, and to the management of the society, its meetings, and exhibitions. They shall provide for an annual fair or exhibition by the society of all the industries and industrial products of the state, at the city of Sacramento; *provided,* that in no event shall the state be liable for any premium awarded or debt created by said board of agriculture; *provided, further,* that the collections and receipts from other sources than state appropriations shall be reported monthly by the secretary to the controller of state and shall be paid into the state treasury. Such receipts shall be credited to the state agricultural society contingent fund, which is hereby created, and shall be for the use of the society.

CHAPTER 570.

An act to amend sections one and five of an act entitled "An act to provide for the management and control of the state agricultural society by the state," approved April 15, 1880, as amended and approved June 11, 1913.

[Approved May 29, 1915.]

The people of the State of California do enact as follows:

SECTION 1. Section one of an act entitled "An act to provide for the management and control of the state agricultural society by the state," approved April 15, 1880, as amended June 11, 1913, is hereby amended to read as follows:

Section 1. The state agricultural society is hereby declared to be a state institution; *provided,* that all rights and privileges which have heretofore accrued to members of said society under its rules, either through payments made or by services rendered, are hereby recognized and continued.

SEC. 2. Section five of said act is hereby amended to read as follows:

Sec. 5. The state board of agriculture shall be charged with the exclusive management and control of the state agricultural society as a state institution; shall have possession and care of its property and be intrusted with the direction of its entire business and financial affairs. It shall define the duties of the secretary and treasurer, fix their bonds and compensation, and shall have power to make all necessary changes in the constitution and rules for the society, to adapt the same to the provisions of this act and to the management of the society, its meetings and exhibitions. It shall provide for an annual fair or exposition by said society of the industries and industrial products of this state and commercial products exported and imported through the ports of this state at the city of Sacramento each year; *provided,* that in any year during which an international exposition conducted in whole or in part under the auspices of the State of California and endorsed by the United States government, is held within the State of California and the state board of agriculture deems it inexpedient to hold a state fair, the funds of the state agricultural society for that year only may be expended in cooperation with the management of said exposition to provide for a proper exploitation of the industries of California at such exposition; *provided, further,* that in no event shall the state be liable for any premium awarded or debt created by the said state board of agriculture; *provided, further,* that the collections and receipts from sources other than state appropriations, shall be reported monthly by the secretary to the controller of state, and shall be paid to the state treasury. Such receipts shall be credited to the state agricultural society contingent fund, which is hereby created, and shall be solely for the use of the society.

CHAPTER 677.

An act to regulate the public service of stallions and jacks in the State of California.

[Approved May 1, 1911.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. Every association, person, firm or corporation standing or offering any stallion or jack for public service in this state shall cause the name, description, and pedigree of such stallion or jack to be enrolled by a stallion registration board hereinafter provided for, and secure a license from said board, as provided in section 3 of this act. All enrollment and verification of pedigree shall be done in the office of the secretary of the California state board of agriculture. All license certificates for stallions or jacks issued under this act shall thereupon be presented to and recorded by the county recorder of the county or counties in which said stallion or jack is used for public service.

SEC. 2. In order to carry out the provisions of this act, there shall be constituted a stallion registration board, whose duty it shall be to verify and register pedigrees; to pass upon certificates of veterinary examination; to provide, when necessary, for veterinary inspection; to issue stallion or jack license certificates; to make all necessary rules and regulations; and to perform such other duties as may be necessary to carry out and enforce the provisions of this act. Said board shall hold meetings at the office of the secretary of the California state board of agriculture the first Tuesday and subsequent days of February, May, August, and November of each year, and such other meetings as may be necessary.

Said stallion registration board shall be composed of three members, consisting of the president and the secretary of the California state board of agriculture and the state veterinarian.

Sec. 3. In order to obtain the license certificate herein provided for, the owner of each stallion or jack shall forward an affidavit signed by a licensed veterinarian to the effect that he has personally examined such stallion or jack, and that, to the best of his knowledge and belief, said stallion or jack, is free from hereditary, infectious, contagious, or transmissible disease or unsoundness. The owner of said stallion or jack shall also furnish to the stallion registration board the studbook certificate of registry of the pedigree of the said stallion or jack when said stallion or jack is registered, and all other necessary papers relative to his breeding and ownership. Upon verification of pedigree and certificate of breeding (in case of pure-bred stallions and jacks), and receipt of veterinarian's affidavit, as provided for in this act, a license certificate shall be issued to the owner.

Sec. 4. The presence of any one of the following named diseases shall disqualify a stallion or jack for public service, and the examining or inspecting veterinarian is hereby duly authorized to refuse to give an affidavit of soundness to the owner of such stallions or jacks affected with any one or more of the diseases herein specified in a transmissible or hereditary form, and the examining or inspecting veterinarian shall so report the same to the secretary of the stallion registration board.

Laryngeal hemiplegia (roaring or whistling); pulmonary emphysema (heaves, broken wind); chorea (St. Vitus' dance, crampiness, shivering, stringhalt); bone spavin; ringbone; sidebone; navicular disease; osteoporosis; curb, when accompanied with faulty conformation of hock; glanders, farcy; maladie du coit; urethral gleet; mange; or any contagious or infectious disease, and the said board is hereby authorized to refuse its certificate of enrollment for any stallion or jack affected with any one of the diseases hereinabove mentioned and to revoke the previously issued enrollment certificate of any stallion or jack found on subsequent examination and investigation to be so affected.

Sec. 5. The stallion registration board shall make and keep records of all stallions and jacks enrolled in the State of California; said stallions or jacks to be enrolled as "pure-bred," "cross-bred," "nonstandard bred," "grade," or "mongrel," according as the facts may have been determined.

Upon making the enrollment of said stallion or jack, said stallion registration board shall issue the above said license.

The stallion registration board is authorized, in cases of emergency, to grant temporary license certificates without veterinary examination, upon receipt of an affidavit of the owner to the effect that, to the best of his knowledge and belief said stallion or jack is free from infectious, contagious, or transmissible disease or unsoundness. Temporary license certificate shall be valid only until veterinary examination can reasonably be made.

Sec. 6. The owner of any stallion or jack used for public service in this state shall post and keep affixed, during the entire breeding season, copies of the license certificate of such stallion or jack, issued under the provisions of this act, in a conspicuous place, both within and upon the outside of the main door leading to every stable or building where the said stallion or jack is used for public service.

Each bill and poster and each newspaper advertisement shall show the enrollment certificate number, and state whether it reads "pure-bred," "grade," "cross-bred," "nonstandard bred" or "mongrel" and it shall be illegal to print or advertise any misleading reference to the breeding of said stallion or jack, his dam or his sire.

SEC. 7. The license certificate issued for a stallion or jack whose sire and dam are of pure breeding, and the pedigree of which is registered in a studbook recognized by the United States department of agriculture, Washington, D. C., an act regulating the importation of breeding animals, approved March 3, 1903, shall be in the following form:

CALIFORNIA STALLION REGISTRATION BOARD.

Certificate of pure-bred stallion or jack No.------------------------
The pedigree of the stallion or jack (name)------------------------
Owned by --
Bred by --
Described as follows:
Color ----------------------- Breed ------------------------
Foaled in the year ------------, has been duly examined, and it is hereby certified that the said stallion or jack is registered as number ----------- in ----------- studbook, said studbook being recognized and certified to by the secretary of the department of agriculture, Washington, D. C., and is of pure breeding. The above named stallion or jack has been examined by ------------------------------------ veterinarian, and is reported as free from infectious, contagious or transmissible disease or unsoundness, ---------------------------- and is licensed to stand for public service in the State of California.
This license expires on------------, 19-----.
(Signed)--------------------------------------,
Secretary California Stallion Registration Board.
Dated this ---------------------, 19----, at Sacramento, Cal.

The license certificate issued for a grade stallion or jack, whose sire or dam is not pure-bred, shall be in the following form:

CALIFORNIA STALLION REGISTRATION BOARD.

Certificate of grade stallion or jack, No.------------------------
The pedigree of the stallion or jack (name)----------------------
Owned by --
Bred by --
Described as follows:
Color --
Foaled in the year ------------, has been duly examined, and it is hereby certified that the said stallion or jack is not of pure breeding, and is, therefore, not eligible for registration in any studbook recognized and certified to by the secretary of the department of agriculture, Washington, D. C. The above named stallion has been examined by ------------------------------, veterinarian, and is reported as free

from infectious, contagious, or transmissible disease or unsoundness, -- and is licensed to stand for public service in the State of California.

This license expires on ------------, 19----.
(Signed)--,
Secretary California Stallion Registration Board.
Dated this ---------------------, 19----, at Sacramento, Cal.

The license certificate issued for a stallion whose sire and dam are pure-bred, but not of the same breed, shall be in the following form:

CALIFORNIA STALLION REGISTRATION BOARD.

Certificate of cross-bred stallion No. ------------------------------
The pedigree of the stallion (name)------------------------------
Owned by --
Bred by --.------------
Described as follows:
Color ---

Foaled in the year ------------, has been duly examined, and it is found that his sire is registered in the -------------------- studbook as number ------------, volume ------------, at page ------------, and his dam in the ------------ studbook as number ------------, volume ------------ and page ------------.

Such being the case, the said stallion is not eligible for registration in any studbook recognized and certified to by the secretary of the department of agriculture, Washington, D. C. The above named stallion has been examined by --------------------, veterinarian, and is reported as free from infectious, contagious or transmissible disease or unsoundness, -- and is licensed to stand for public service in the State of California.

This license expires on ------------, 19----.
(Signed)--,
Secretary California Stallion Registration Board.
Dated this ---------------------, 19----, at Sacramento, Cal.

The license certificate issued for a nonstandard bred stallion, shall be in the following form:

CALIFORNIA STALLION REGISTRATION BOARD.

Certificate of nonstandard bred stallion, No. -------------------------
The pedigree of the stallion (name)------------------------------
Owned by --
Bred by ---
Described as follows:
Color ---

Foaled in the year ------------, has been duly examined, and it is hereby certified and found that said stallion is not eligible to registration as standard bred, and for the purpose of this license is not pure bred, although recorded in the nonstandard department of the American trotting register.

The above named stallion has been examined by--------------------, veterinarian, and is reported as free from infectious, contagious or

transmissible disease or unsoundness, ---------------------------------
and is licensed to stand for public service in the State of California.

This license expires on ------------, 19----.

(Signed) ---------------------------------------,
Secretary California Stallion Registration Board.

Dated this ---------------------, 19----, at Sacramento, Cal.

CALIFORNIA STALLION REGISTRATION BOARD.

Certificate of "mongrel" stallion or jack No. -----------------------

The pedigree, as far as known or traced, of the stallion or jack (name) ---

Owned by --

Bred by --

Described as follows:

Color --

Foaled in the year ------------, has been duly examined, and it is hereby certified that the said stallion or jack is of mongrel breeding, and is not eligible for registration in any studbook recognized and certified to by the secretary of the department of agriculture, Washington, D. C.

The above named stallion has been examined by ------------------, veterinarian, and is reported as free from infectious, contagious, or transmissible disease or unsoundness, ---------------------------------
and is licensed to stand for public service in the State of California.

This license expires on ------------, 19----.

(Signed) ---------------------------------------,
Secretary California Stallion Registration Board.

Dated this ---------------------, 19----, at Sacramento, Cal.

SEC. 8. A fee of $2.50 shall be paid to the secretary of the California stallion registration board for the examination and enrollment of each stallion or jack pedigree, and for issuance of a license certificate in accordance with the breeding of the stallion or jack as above provided, which shall be in force and effect for a period of one year, from its date, and for the purpose of carrying out the provisions of this act. The fee shall be paid to the secretary of the California stallion registration board at the time the application is made for enrollment.

Upon a transfer of the ownership of any stallion or jack enrolled under the provisions of this act, the certificate of enrollment may be transferred to the transferee by the secretary of the California stallion registration board, upon submittal of satisfactory proof of such transfer of ownership, and upon payment of a fee of $1.00. A fee of $1.00 shall be paid annually for the renewal of a license certificate.

A fee of $1.00 shall be paid for a duplicate license certificate, upon proof of the loss or destruction of the original certificate.

SEC. 9. Every stallion or jack for which a license has been issued shall be exempt from further examination, unless from later developments it becomes known, and a complaint is filed, certified to by three men, one of whom shall be licensed veterinarian, that said stallion or jack has some hereditary, contagious, or infectious disease, which was not evident at the time of previous examination. When such complaint is made, and a request for examination is asked, such complaint shall be filed with the secretary of the California stallion registration board, who shall have another examination made, but the owner of the stallion or jack shall have the right to select a veterinarian legally qualified to practice as such in this state, to act with such examining veterinary, and in case these two shall fail to agree upon a verdict or decision these two veterinarians shall appoint a third qualified veterinarian, with the consent and approval of said board and owner, who shall act as referee therein, and the decision of said referee shall be final. If such complaint is found to be correct it shall be so reported to the secretary, who shall revoke the license in force; *provided,* that the owner of any stallion used for public service in this state shall have a lien on all colts sired by said stallion for the service fee for a period of one year from the date of the foaling of said colt, as now provided by law.

SEC. 10. Every association, person, firm or corporation violating any of the provisions of this act, shall be guilty of a misdemeanor, and shall be punished by a fine not exceeding one hundred dollars ($100) for each offense; or by imprisonment in the county jail not exceeding fifty days, or by both such fine and imprisonment.

SEC. 11. The funds accruing from the above named fees shall be used by the said stallion registration board to defray the expenses of enrollment of pedigrees and issuance of licenses; to provide for the examination of stallions and jacks, when necessary; to publish reports or bulletins containing lists of stallions and jacks examined, which shall be not less than one in each year; to encourage the horse breeding interests in this state; to disseminate information pertaining to horse breeding, and for any other purposes as may be necessary to carry out the purposes and enforce the provisions of this act. Each member of the above committee shall receive his actual expenses incurred while in the performance of any duty imposed under the provisions of this act; the secretary of said board shall receive for his services an amount to be fixed and agreed upon by said board.

It shall be the duty of the said stallion registration board to enforce the provisions of this act, and to make an annual report, including financial statement, to the governor of the state, on September 15th of each year.

SEC. 12. This act shall take effect and be in force on August 1st, 1911.

CHAPTER 584.

An act to provide for the collection, compilation and publication of agricultural and other industrial statistics for the State of California, and making an appropriation therefor.

[Approved April 25, 1911.]

The people of the State of California, represented in senate and assembly, do enact as follows:

SECTION 1. The board of directors of the state agricultural society are authorized, and it is hereby made their duty, to collect, compile and publish annually, on or before the 31st day of January in each year, statistics showing the yield of agricultural and other farm and industrial products of the State of California for each preceding year, and shall, as nearly as may be practicable, ascertain and publish each year the number of acres of land within the state that are under irrigation, and the number, location and extent of any new irrigation enterprises, exclusive of individual pumping plants, that may have been started within the state during the preceding year.

SEC. 2. For the purpose of carrying out the provisions of this act, the sum of five thousand ($5,000.00) dollars per annum is hereby appropriated out of any money in the state treasury not otherwise appropriated, and the controller is hereby authorized to draw his warrant from time to time up to the amount of said appropriation in favor of the board of directors of the state agricultural society, and the state treasurer is hereby authorized and directed to pay the same.

STATISTICAL SUMMARY

OF THE

Production and Resources

OF

CALIFORNIA

BY

GEORGE ROBERTSON
Statistician.

PREFACE.

The law under which this report is prepared requires the annual collection, compilation, and distribution of statistics relating to the production and resources of the state. In the most important subjects the statistics are carried back for from ten to twenty-five years, but those who desire earlier information will find it in the first Statistical Reports, issued in 1911 and 1912, where the statistics go back to the year 1850, when the state was first organized.

Statistics must cover a number of years to be of any real value, in order that comparisons may be made, and the measure of progress, or falling off, may be determined. Nothing can give a clearer or more precise idea of the development of a country than statistics, for figures speak more eloquently and convincingly than glowing literary descriptions, which are often exaggerated. In the business world today there are few things more valuable than reliable statistical data.

The various branches of agriculture and other subjects dealt with in this volume might be greatly extended, and much other information could be added, but the space available is limited by the amount of the appropriation of $5,000 per annum.

The statistics regarding population, area of farm lands, and the number of fruit trees, are compiled from the Reports of the Census, which contain the only reliable figures obtained by actual count, and not by incomplete estimates, which are often published, but upon which no reliance can be placed. Few people realize or understand the magnitude of such work, covering a state as large as California, or consider the time and number of men necessary to compile such details, but as an illustration, the pay alone of the enumerators employed by the Census Bureau in 1910 in this state was upwards of $151,000.

The great difficulty in obtaining reliable information from county sources is their tendency to exaggerate, and overestimate their productions and its value, which does far more harm than good.

The various sources of the statistics contained in this report are the most trustworthy that can be obtained and the information has been brought down to the latest possible date. It contains a condensed summary of hundreds of federal and state reports, and other details obtained from a large number of correspondents in every industry from all parts of the state.

The great importance and value of statistics is now universally recognized, but it is a science which has been much neglected in California. In the reports published in all civilized countries it is usual to give the figures for 10 or 20 years, and even longer periods, in order to enable comparisons to be made, and this precedent has been followed, as being the only way in which reliable data can be secured. The Australian and New Zealand colonies, with a much smaller population than California, devote from $21,000 to $50,000 each per annum for such purpose, and even Japan and the Argentine Republic publish very complete statistical reports—and in English. Taking into consideration the small sum available for the work, this report is fairly comprehensive, and although supplying more statistical information than any other yet issued, it falls far behind what such a work should be.

On September 3, 1916, a disastrous fire destroyed the main pavilion and offices in the State Fair Grounds, the valuable library and all documents being a total loss, which has added to the difficulties in compiling this report.

Acknowledgments and expressions of high appreciation are due to the United States Department of Agriculture, Bureau of the Census, Department of Commerce, United States Geological Survey, Commissioner of Fisheries, Commissioner of Indian Affairs, General Land Office, National Conservation Commission, the United States Reclamation Service, the Commissioner of Internal Revenue, the Comptroller of the Currency, the Bureau of Corporations, the District Forester, the United States Bureau of Plant Industry, Indio, Frank Adams, irrigation manager, University of California, and E. L. Adams, United States Biggs Cereal Field Station, Butte County, and Prof. George H. Willson of the United States Weather Bureau of San Francisco.

Among the state departments, valuable assistance has been received from the State Controller's Department, the State Water Commission, Department of Engineering, the Railroad Commission of California, Mr. Fletcher Hamilton, State Mineralogist, the State Fish and Game Commission, the Surveyor General, State Board of Forestry, Insurance Commissioner, Superintendent of Banks, Motor Vehicle Department, State Dairy Bureau, and the splendid State Library at the Capitol.

Valuable assistance has been received from the California Associated Raisin Company, the Imperial Valley Long-Staple Cotton Growers' Association, California Cotton Mills Company, and many others.

GEORGE ROBERTSON,
Statistican.

Sacramento, California, July 1, 1917.

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Colusa—Part taken to form Glenn in 1891.

Del Norte—Part annexed to Siskiyou between 1880 and 1890.

Fresno—Part taken to form Madera in 1893, and part annexed to Kings in 1909.

Glenn—Organized from part of Colusa in 1891.

Humboldt—Part of Klamath annexed in 1874.

Imperial—Organized from part of San Diego in 1907.

Kings—Organized from part of Tulare in 1893, and part of Fresno annexed in 1909.

Lake—Part annexed to Napa in 1872.

Los Angeles—Part taken to form Orange in 1889.

Madera—Organized from part of Fresno in 1893.

Modoc—Organized from part of Siskiyou in 1874.

Monterey—Part taken to form San Benito in 1874.

Napa—Part of Lake annexed in 1872.

Orange—Organized from part of Los Angeles in 1889.

Riverside—Organized from parts of San Bernardino and San Diego in 1893.

San Benito—Organized from part of Monterey in 1874.

San Bernardino—Part taken to form part of Riverside in 1893.

San Diego—Part taken to form part of Riverside in 1893, part taken to form Imperial in 1907.

Santa Barbara—Part taken to form Ventura in 1871.

Siskiyou—Part taken to form Modoc in 1874: part of Klamath annexed in 1874, and part of Del Norte annexed between 1880 and 1890.

Tulare—Part taken to form Kings in 1893.

Ventura—Organized from part of Santa Barbara in 1871.

INCORPORATED PLACES.

Bakersfield—Part of township 3 (Kern City) annexed in 1909.

Berkeley—Part of Oakland township annexed in 1906 and 1908.

Fresno—Part of township 3 annexed in 1910.

Los Angeles—Parts of Ballona, Burbank, Cahuenga, and San Antonio townships annexed between 1890 and 1900; part of Ballona township annexed in 1906; part of Welmington township (including San Pedro City) annexed in 1909, and parts of Burbank and Cahuenga townships annexed in 1910.

Oakland—Parts of Brooklyn and Oakland townships annexed in 1909.

Ontario—Parts of Ontario township annexed in 1901.

Pasadena—Parts of Pasadena township annexed in 1904 and 1906.

San Leandro—Part of Brooklyn township annexed in 1909.

Counties and County Seats. Acreage and Population.

County	County seat	Elevation, county seats	Number of acres of land assessed	Approximate land area (acreage)	Population of county seats, 1915†
Alameda	Oakland	36	458.370	468.480	185,000
Alpine	Markleeville	*	42.947	496.640	309
Amador	Jackson	1.975	297.858	384.640	2,500
Butte	Oroville	250	900.618	1,102,080	3,300
Calaveras	San Andreas	*	501,317	657,280	‡
Colusa	Colusa	60	612.467	729.600	2.000
Contra Costa	Martinez	125	459,505	456,960	3,000
Del Norte	Crescent City	50	220.958	655.360	1,200
El Dorado	Placerville	1,875	671.741	1.121.920	2.150
Fresno	Fresno	293	2,251.340	3.808.000	45,000
Glenn	Willows	136	622.414	805.760	3.000
Humboldt	Eureka	64	1,650,336	2,325.760	15.000
Imperial	El Centro	—2	992.686	2.616.960	6,000
Inyo	Independence	3,907	275.436	6.412.160	‡
Kern	Bakersfield	404	3.225.581	5.121,920	19,220
Kings	Hanford	249	823,434	741,760	6,250
Lake	Lakeport	*	373,047	817,920	1,100
Lassen	Susanville	4,175	820.981	2,899.840	1,000
Los Angeles	Los Angeles	293	1,208.856	2,602,880	550,000
Madera	Madera	272	765.669	1,351,680	3,300
Marin	San Rafael	*	321.871	338,560	6,000
Mariposa	Mariposa	*	334.510	936,320	‡
Mendocino	Ukiah	620	1,650,784	2,209.920	2.600
Merced	Merced	173	1,179.401	1,276,800	4,000
Modoc	Alturas	4,460	687.736	2.446,720	1,500
Mono	Bridgeport	6,500	174,957	1,939.200	‡
Monterey	Salinas	40	1.457.998	2,131,200	5,000
Napa	Napa	20	410.310	501,120	6.500
Nevada	Nevada City	2,580	480,764	623.360	3,000
Orange	Santa Ana	137	446,012	508,800	14.500
Placer	Auburn	1,360	632.270	892.800	2,366
Plumas	Quincy	3.400	529.305	1.660,160	‡
Riverside	Riverside	851	1.789.975	4.633.600	19.000
Sacramento	Sacramento	71	600.146	629,120	75,000
San Benito	Hollister	284	592.658	890.880	2.500
San Bernardino	San Bernardino	1,054	1.379.864	12.900.480	18.000
San Diego	San Diego	93	1,179,782	2,701,440	90.000
San Francisco	San Francisco	207	29.760	27,520	530,000
San Joaquin	Stockton	24	870.916	926,720	42.000
San Luis Obispo	San Luis Obispo	201	1,626,445	2.133,760	6,500
San Mateo	Redwood City	8	307,332	286,080	3.500
Santa Barbara	Santa Barbara	130	1,042.107	1,753,600	15.000
Santa Clara	San Jose	95	743.822	849,920	34,000
Santa Cruz	Santa Cruz	20	259,289	278,400	13.600
Shasta	Redding	552	1.483.086	2,469,120	4.800
Sierra	Downieville	3.150	325.431	590,720	‡
Siskiyou	Yreka	2,635	1,870,241	4,003.840	1,500
Solano	Fairfield	12	515,215	526.080	1,000
Sonoma	Santa Rosa	181	914,985	1,009.280	11,000
Stanislaus	Modesto	90	870,900	928,000	7,200
Sutter	Yuba City	57	374,513	389,120	1,700
Tehama	Red Bluff	307	1,295,611	1.851.520	5,072
Trinity	Weaverville	2.046	582.980	2,026,240	‡
Tulare	Visalia	334	1,412,396	3,107,840	6.000
Tuolumne	Sonora	1,825	450,629	1,401,600	2.029
Ventura	Ventura	43	563,766	1,201,920	3,500
Yolo	Woodland	58	597,763	648.960	5,000
Yuba	Marysville	67	396,104	408,960	6,000
Totals			47,557,195	99,617,280	
Estimated population of the State					2,757,895

*Not ascertained. †Estimated. ‡Not reported. These are small towns with a population of a few hundred.

THE STATE OF CALIFORNIA.

(Date of organization as a Territory, March 1, 1847; as a State, September 9, 1850.)

PART I.

AREA, FARMS AND FARM LANDS.

Vacant Public Lands; Homesteads; Indian Reservations; School Lands; Homesteads; Dry Farming; Vacant Public Lands; Number and Value of Farms; Size of Farm Mortgage Debt on Farms; Improved and Unimproved Farm Land; Irrigation on Farms.

The state of California is about 780 miles in length; its breadth varies from 150 to 350 miles and its total area is 158,297 square miles, of which 2,645 are water surface. In size it ranks second among the states of the Union, Texas being the only one to exceed it, and it is larger than the nine states of New York, New Jersey, Rhode Island, Massachusetts, Maine, Vermont, New Hampshire, Connecticut and Ohio, combined. The coast line is more than 1,000 miles long.

California has the highest and lowest land of the United States, the greatest variety of temperature and rainfall, and of products of the soil. The spread of irrigation and of intensive cultivation and the increase of small farms during the last twenty years, have made California what it is today.

Agriculture had its beginning in wheat raising on great ranches, from fifty to several hundred thousand acres in extent; then deciduous orchard fruits and semitropical citrus fruits, successively.

Both the Spanish and Mexican governments made large grants of land to encourage settlement. These were used as cattle ranches exclusively, up to the time of the American occupation, and the exports consisted entirely of hides and tallow. These grants covered the valleys of the state to a large extent, and later were recognized and patented by the United States Government. About 500 of these claims, covering nearly nine million acres, were found to be valid.

Of the fifty-eight counties into which the state is now divided, the first twenty-seven were organized on February 18, 1850; ten years later the number had increased to forty-two. In 1872, Ventura became the fiftieth county, and Imperial, the latest addition, was formed in 1907.

The land area of the state is about 99,898,880 acres, a great part of which is rough, mountainous country and desert, roughly classified as follows:

Land surface		Water surface		Total	
Square miles	Acres	Square miles	Acres	Square miles	Acres
155,652	99,898,880	2,645	1,692,800	158,297	101,310,080

Approximately one-half of the land surface of the state is under the control of the federal government, including 19,532,731 acres in the national forests, on January 1, 1916. The areas designated as "National Forests" were formerly called "Forest Reserves," but the title was changed by act of congress of March 4, 1907. Up to June 30, 1916, the amount of swamp land patented to the state was 2,096,082 acres.

Indian Reservations.

The Indians were prominent in early California history, but their progress towards their present insignificance began far back in the Spanish period. It proceeded much more rapidly after the restraining influence of the Missions was removed, leaving them free to revert to savagery; and the downward progress of the race was fearfully accelerated during the mining period, when they were ambushed, depraved, and in large numbers killed. There have been no Indian wars in California's annals, but many butcheries.

The natives have declined exceedingly in number since 1834. They have always been mild-tempered, low, and unintelligent, and are today a poor and miserable race. They are called "Digger Indians," indiscriminately, although divided by a multiplicity of tongues.

The Indians of California.

The Indians of California are of at least fourteen different linguistic stocks. The government, in dealing with the California tribes, did not follow the policy pursued with the wild Indians of the plains, and no treaties were made with them and no remuneration paid for lands acquired by white settlers. Large numbers are located on twenty-six reservations, namely: Hoopa Valley, Round Valley, Tule River, Yuma, and twenty-two Mission reservations.

Most of the Mission Indians are located on small reservations scattered over Riverside and San Diego counties. Among them are found representatives of a number of different tribes.

Round Valley reservation, embracing an area of 59 square miles, is situated in Mendocino County, and the remnants of nine small tribes are located here, who might well be classed as civilized. Tule River reservation in Tulare County contains 76 square miles, and contains the remainder of the once powerful Tule tribe. The Yuma reservation contains an area of 71¾ square miles, the Indians living on this section being the most primitive of the California tribes in manners and customs.

Indians are located in 55 of the 58 counties of the state. The allotments number 2,592, the acreage amounting to 82,162 acres allotted, 430,136 unallotted, or a total of 512,298 acres.

Indian Reservations, Years ending June 30, 1890-1916.
Area—Unallotted.

1890		1900		1915		1916	
Acres	Square miles	Acres	Square miles	Acres	Square miles	Acres	Square miles
494,045	772	406,396	635	430,136	672	430,136	672

Indian Population, Years ending June 30, 1890-1916.

1890	1900	1915	1916
12,108	11,431	15,034	15,335

Public and Indian Lands Originally Entered, Years Ending June 30, 1903-1916.

(In acres.)

1903	957,507	1910	1,214,348
1904	986,253	1911	1,064,644
1905	1,032,758	1912	872,301
1906	809,811	1913	937,230
1907	579,294	1914	878,874
1908	766,932	1915	1,001,663
1909	1,290,579	1916	640,361

Original Homestead Entries, Years ending June 30, 1903-1916.

(In acres.)

1903	300,968	1910	278,700
1904	266,317	1911	1,062,005
1905	262,973	1912	871,381
1906	211,567	1913	381,129
1907	173,438	1914	393,702
1908	235,816	1915	498,477
1909	216,699	1916	496,743

Lands Certified or Patented on Account of Railroad Grants, Years Ending June 30, 1903-1916.

(In acres.)

1903	76,089	1910	364,084
1904	347,258	1911	442,879
1905	426,951	1912	23,995
1906	318,986	1913	--------
1907	100,971	1914	1,040
1908	3,897	1915	313,741
1909	589,000	1916	81,633

Land Areas Patented, Years Ending June 30, 1913, 1915, and 1916.

Year	Acres
1913	202,362
1915	641,314
1916	336,656

Vacant Public Lands—Areas Unappropriated and Unreserved, Years ending June 30, 1900-1916.

(In acres.)

Year	Surveyed	Unsurveyed	Total
1900	34,423,923	8,043,589	42,467,512
1912	17,671,839	5,343,499	23.015.338
1913	15.633.304	5,220,333	20,853,637
1914	**16,183,344**	**4**,719,408	20,902,752
1915	16,244,018	4,391,905	20,635,923
1916	15,777,934	4,248,065	20,025,999

National Parks and National Monuments.

There are four national parks and six national monuments in California. The former were created by acts of congress and the latter by proclamations of the President. The name of each, with the date of creation and present area, is shown by the following table:

Name	Date created	Area, acres
Yosemite National Park*	Oct. 1, 1890	719,622.40
Sequoia National Park†	Sept. 25, 1890	161,597.00
General Grant National Park	Oct. 1, 1890	2,536.00
Lassen Volcanic National Park	Aug. 9, 1916	79,220.00
Devil Postpile National Monument	July 6, 1911	800.00
Lassen Peak National Monument‡	May 6, 1907	1,280.00
Cinder Cone National Monument	May 6, 1907	5,120.00
Muir Woods National Monument	Jan. 9, 1908	295.00
Pinnacles National Monument	Jan. 16, 1908	2,080.00
Cabrillo National Monument	Oct. 14, 1913	21,910 sq. ft.

*Boundary changed by Congress in 1905 and again in 1906.
†Boundary changed by Congress October 1, 1890.
‡Within Lassen Volcanic National Park.

SALE OF SCHOOL LANDS.

By chapter 395 of the year 1915, the unsold portions of the sixteenth and thirty-sixth sections of school lands not included within the exterior boundaries of national reservations, the unsold portions of the five hundred thousand acres granted to the state for school purposes, and the unsold portions of the listed lands selected of the United States in lieu of the sixteenth and thirty-sixth sections and losses to the school grant, which are suitable for cultivation, shall be sold to actual settlers in quantities not exceeding three hundred and twenty acres to any one person under the provisions of section three thousand four hundred ninety-five of the Political Code, at a price to be fixed by the state board of control and the state surveyor general.

School lands *not suitable for cultivation* will be sold pursuant to the provisions of chapter 389, Statutes of California, 1915, at public auction, to the highest bidder.

The acreage of school lands still unsold amounts to 614,023. The ten counties having no unsold school lands left are: Alameda, Contra Costa, Kings, Marin, Orange, Sacramento, San Francisco, San Joaquin, San Mateo, and Sutter.

According to the list of the counties that contain any school lands in 1915, Merced has the smallest amount, 20 acres, and San Bernardino the greatest, 244,964 acres. Most of this, however, is desert area, incapable of producing agricultural products.

The acreage of vacant lands in the counties is as follows:

School Lands Still Unsold.*

County	Acres	County	Acres
Alpine	120	Placer	955
Amador	160	Plumas	520
Butte	2,185	Riverside	20,738
Calaveras	720	San Benito	549
Colusa	600	San Bernardino	244,964
Del Norte	320	San Diego	16,944
El Dorado	1,920	San Luis Obispo	3,647
Fresno	440	Santa Barbara	129
Glenn	440	Santa Clara	1,777
Humboldt	1,128	Santa Cruz	75
Imperial	24,010	Shasta	14,120
Inyo	132,487	Sierra	1,160
Kern	9,395	Siskiyou	8.204
Lake	7,451	Solano	283
Lassen	44,992	Sonoma	605
Los Angeles	594	Stanislaus	1,280
Madera	600	Tehama	7,800
Mariposa	2,331	Trinity	4,462
Mendocino	6,953	Tulare	1,150
Merced	20	Tuolumne	1,274
Modoc	16,186	Ventura	80
Mono	22,297	Yolo	480
Monterey	4,420	Yuba	510
Napa	1,903		
Nevada	640	Total	614,023

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*For the latest details and regulations see the Bulletin issued by the State Surveyor General, September 1. 1916.

VACANT PUBLIC LANDS.

Practically all the vacant public land which is easily accessible has been already taken up, the areas now remaining being situated at a considerable distance from towns or villages, or in remote mountain valleys

Before entry, personal inspection of the lands should be made to ascertain if they are suitable, and when the applicant is satisfied on this point, entry can be made at the local land office. Information regarding vacant land in any district can be obtained on application to the register and receiver of the proper local land office, who will give full information regarding vacant land and the steps necessary to be taken in making entry. All vacant unappropriated public lands, nonmineral and nonsaline in character, are subject to entry under the homestead laws.

Homesteads.

Any person who desires to obtain a homestead must be a citizen of the United States or have declared his intention to become such, over the age of 21 years, and not the proprietor of more than 160 acres of land in the United States.

Six months from the date of filing is allowed to establish a bona fide residence on the homestead, which from that time to the date of the final proof must be the home of the applicant to the exclusion of a home elsewhere.

Under the new homestead law the entryman must, within six months after filing, establish actual residence on the land, build a habitable house and actually live on the land to make it a home for seven months out of each year for three years, and cultivate at least one-eighth of the land.

Residence can not be maintained by occasional visits to the land while the actual home is elsewhere. The homesteader must manifest entire good faith in occupying the land as a permanent home to the exclusion of one elsewhere.

The settler must show that he has cultivated one-sixteenth of the area of the land, beginning with the second year from date of entry, and one-eighth of the area the following year and until proof is submitted. A mere breaking of the soil will not meet the terms of the law, but such breaking and stirring of the soil must be accompanied by planting or the sowing of seed and tillage for crops other than native grasses. If his proof is satisfactory, and the government, after investigation, finds that he has complied with the law in good faith, his entry will be clear-listed, and in due time he will receive a patent for the land.

The homesteader may, before three years, by paying the purchase price of the land, at the rate of $1.25 per acre if it is situate outside the limits of a railroad grant, and at the rate of $2.50 per acre if it is within the granted limits of a railroad, offer what is known as commutation proof, which must show at least fourteen months of actual and substantially continuous residence, with bona fide cultivation and improvement of the land, immediately prior to his application to make such proof.

The United States Land Office fees and commissions for filing on 160 acres are $16.00, if the land is outside of the limits of a railroad grant; if inside the granted limits of a railroad they would amount to $22.00. The fees and commissions are computed upon the acreage of the tract entered.

The final proof commissions on 160 acres would be $6.00, if the land is outside a railroad grant, and $12.00 if inside the limits of a grant. Added to this are fees ranging from $2.00 to $4.00 based upon the number of words of testimony in the proof. There are no other fees or commissions required of a homesteader by the government.

Those who commute their homesteads must pay the purchase price of the land in addition to the above fees, except the final proof commissions, which are not required on commuted homesteads.

The following summary, based on reports furnished by the district land offices, show, by land districts, and counties, the area of unappropriated and unreserved public lands, surveyed and unsurveyed, and a brief description of the character of the vacant lands. The General Land Office can furnish no more definite information as to the location and character of the vacant lands than is here given. Inquiries regarding the climate and soil in any given vicinity may be addressed to the Department of Agriculture.

A township diagram, showing only entered lands in any township, can be procured by sending $1.00 to the register and receiver of the land office of that district. The diagram required should be specified by township and range number.

While the following figures may not be absolutely correct, owing to liability to error in a work of such magnitude and to the necessity of making estimates of unsurveyed lands, it is believed that they afford a close approximation to the actual areas. The statement is intended to inform correspondents and the general public as to whether there is much or little public land in the several land districts therein and in particular counties and localities.

In some counties only a few acres are reported as vacant, and in seven all the land has already been taken up. Neither the General Land Office nor the local land officers can furnish information as to the location of such tracts, but such information may be obtained from the records of the local land offices which, when not in official use, are open to inspection by prospective home seekers or their agents.

Dry Farming.

The United States Government is not only interested in settling its irrigated lands, but also in developing all parts of its territory, and for this reason the various bureaus of the Department of Agriculture have been studying the soils of the West and also scouring the world to find crops suited for these regious. Dry farming is meeting with a certain amount of success in various parts of the country, and the combined efforts of all of these endeavors to make fertile and productive these lands will result in an era of unprecedented prosperity for the entire West.

A regulation has recently been issued increasing the area of a homestead from 160 to 320 acres on land having no water supply, in Los Angeles, Imperial, San Diego, and Riverside counties.

The total acreage of land unappropriated and unreserved on July 1, 1916, was 20,025,999 acres, or a decrease of 609,924 acres compared with the previous year.

Statement Showing the Area of Land in California Unappropriated and Unreserved on July 1, 1916.

Land district and county	Area in acres			Character
	Surveyed	Unsurveyed	Total	
Eureka—				
(Opened July 24, '58.)				
Del Norte	831		831	Sea beach, mountainous.
Humboldt	82,800	18,131	100,931	Mountainous, farming, grazing.
Mendocino	8,318		8,318	Mountainous, grazing, timber.
Siskiyou	1,179		1,179	Farming, forest listings.
Trinity	19,936	2,560	22,496	Mountainous, grazing, timber, farming.
Totals	113,064	20,691	133,755	
Independence—				
(Opened Mar. 22, '87.)				
Alpine	10,581		10,581	Mountainous, grazing, mineral.
Inyo	2,623,940	1,207,743	3,831,683	Agricultural, mountainous, desert.
Kern	619,497	98,041	717,538	Grazing, mineral, agricultural.
Mono	283,183	40,573	323,756	Grazing, mineral, agricultural.
San Bernardino	2,248,881	1,097,729	3,346,610	Mountainous, mineral, desert.
Totals	5,786,082	2,444,086	8,230,168	
Los Angeles—				
(Opened Sept. 22, '69.)				
Imperial	722,240	204,080	926,320	Level desert.
Kern	33,272	14,347	47,619	Arid, level desert, mountainous.
Los Angeles	537,287	137,532	674,819	Arid, level desert, mountainous.
Orange	20,008	1,906	21,914	Mountainous, hilly.
Riverside	1,498,102	339,100	1,837,202	Mountainous, rolling, level desert.
Santa Barbara	40,531	6,176	46,707	Mountainous, rolling.
San Bernardino	3,207,181	409,726	3,616,907	Mountainous, rolling, level desert.
San Diego	163,709	332,839	496,548	Mountainous, rolling, level desert.
Ventura	42,648	52,418	95,066	Mountainous, rolling.
Totals	6,264,978	1,498,124	7,763,102	

Statement Showing the Area of Land in California Unappropriated and Unreserved on July 1, 1916—Continued.

Land district and county	Area in acres			Character
	Surveyed	Unsurveyed	Total	
Sacramento—				
(Opened Nov. 12, '67.)				
Alpine	18,760	----------	18,760	Mountainous.
Amador	13,381	----------	13,381	Hilly, grazing, mineral, farming.
Butte	24,574	----------	24,574	Hilly, grazing, mineral, farming.
Calaveras	62,832	----------	62,832	Hilly, grazing, mineral, farming.
Colusa	34,636	1,280	35,916	Hilly, grazing, mineral, farming.
El Dorado	39,229	----------	39,229	Hilly, grazing, mineral, farming.
Fresno	13,101	2,560	15,661	Hilly, grazing, mineral, farming.
Glenn	14,395	----------	14,395	Hilly, grazing, mineral, farming.
Lake	9,720	----------	9,720	Mountainous.
Madera	26,739	----------	26,739	Hilly, grazing, farming, mineral.
Mariposa	64,268	----------	64,268	Hilly, grazing, farming, mineral.
Merced	13,697	----------	13,697	Hilly, grazing, farming, mineral.
Modoc	841	6,080	6,921	Mountainous, grazing, timber.
Napa	14,520	----------	14,520	Mountainous, grazing, timber.
Nevada	6,621	----------	6,621	Mineral, hilly, grazing.
Placer	23,729	----------	23,729	Mineral, hilly, grazing.
Stanislaus	17,134	----------	17,134	Mineral, hilly, grazing.
Shasta	195,400	2,160	197,560	Farming, grazing, timber, mineral.
Siskiyou	156,938	46,590	203,528	Farming, grazing, timber, mineral.
Tuolumne	31,974	1,600	33,574	Mineral, grazing, timber.
Tehama	13,188	720	13,908	Hilly, grazing, mineral.
Trinity	28,860	4,960	33,820	Mountainous, grazing, mineral, timber.
Yolo	38,776	----------	38,776	Hilly, grazing.
Yuba	25,805	----------	25,805	Hilly, grazing, mineral.
Totals	889,118	65,950	955,068	
San Francisco—				
(Opened May 1, '11.)				
Alameda	1,255	1,519	2,774	Mountainous.
Colusa	13,385	----------	13,385	Mountainous.
Contra Costa	1,417	----------	1,417	Mountainous.
Fresno	57,416	3,862	61,278	Mountainous.
Glenn	1,920	----------	1,920	Mountainous.
Kern	29,482	----------	29,482	Mountainous.
Kings	2,400	----------	2,400	Mountainous.
Lake	151,622	8,840	160,462	Mountainous.
Merced	19,100	----------	19,100	Mountainous.
Mendocino	195,371	17,690	213,061	Mountainous.
Monterey	250,221	2,560	252,781	Mountainous.
Napa	43,445	----------	43,445	Mountainous.
San Benito	163,957	4,035	167,992	Mountainous.
San Joaquin	2,120	----------	2,120	Mountainous.
San Luis Obispo	217,545	3,840	221,385	Mountainous.
Santa Barbara	29,904	----------	29,904	Mountainous.
Santa Clara	52,767	3,660	56,427	Mountainous.
Solano	1,980	----------	1,980	Mountainous.
Sonoma	46,030	4,640	50,670	Mountainous.
Stanislaus	23,791	2,926	26,717	Mountainous.
Yolo	6,744	640	7,384	Mountainous.
Ventura	1,216	----------	1,216	Mountainous.
Totals	1,313,088	54,212	1,367,300	
Susanville—				
(Opened Mar. 2, '71.)				
Lassen	799,295	46,746	846,041	Timber, desert, grazing, mineral.
Modoc	245,420	16,840	262,260	Timber, desert, grazing, farming.
Plumas	10,300	3,877	14,177	Mountainous, timber, mineral.
Sierra	21,600	----------	21,600	Mountainous, timber, mineral.
Totals	1,076,615	67,463	1,144,078	

Statement Showing the Area of Land in California Unappropriated and Unreserved on July 1, 1916—Continued.

Land district and county	Area in acres			Character
	Surveyed	Unsurveyed	Total	
Visalia—				
(Opened July 10, '58.)				
Fresno	148,230	7,067	155,297	Mountainous, grazing.
Kern	85,065	26,724	111,789	Mountainous, grazing.
Kings	28,897	----------	28,897	Mountainous, grazing.
Merced	8,361	----------	8,361	Mountainous, grazing.
Monterey	1,920	----------	1,920	Mountainous, grazing.
San Benito	8,426	----------	8,426	Mountainous, grazing.
Tulare	54.090	63,748	117,838	Mountainous, grazing.
Totals	334,989	97,539	432,528	
State totals	15,777,934	4,248,065	20,025,999	

The following seven counties have no unappropriated or unreserved public land:

Marin,
Sacramento,
San Francisco,
San Joaquin,
San Mateo.
Santa Cruz,
Sutter,

FARMS AND FARM LANDS.

California ranks second in land area and twelfth in population among the states of continental United States. The soils vary from heavy clay like "adobe" soils to sandy and gravelly loams.

Over one-fourth (28 per cent) of the land area of the state is in farms. The average value of farm land per acre for the state as a whole is $47.16. Between 1900 and 1910 there was an increase of 21.6 per cent in the number of farms as compared with an increase of 60.1 per cent in the population.

During the same period farm property, which includes land, buildings, implements and machinery, and live stock (domestic animals, poultry and bees), increased in value $818,167,000, or 102.7 per cent.

The average value of a fully equipped farm is $18.308, an increase of $7,328 as compared with the average in 1900. The average value per acre of land alone rose from $21.87 in 1900 to $47.16 in 1910.

There are 58.926 native white farmers in the state; 26,193 foreign born, white, and 3,078 Negro and other nonwhites, or a total of 88.197.

In addition to 11,389.894 acres of improved land in farms, there is 4,541,767 acres of woodland, and 11.999,783 acres of other unimproved lands in farms, or a total of 27,931,444 acres.

Farm Land.

Farm land is divided into (1) improved land, (2) woodland, and (3) all other unimproved land. *Improved land* includes all land regularly tilled or mowed, land pastured and cropped in rotation, land lying fallow, land in gardens, orchards, vineyards, and nurseries, and land occupied by farm buildings. *Woodland* includes all land covered with natural or planted forest trees, which produce, or later may produce, firewood or other forest products. *All other unimproved land* includes brush land, rough or stony land, swamp land, and any other land which is not improved or in forest. The census classification of farm land as "improved land," "woodland," and "other unimproved land" is one not always easy for the farmers or enumerators to make and the statistics therefore must be considered at best only a close approximation.

Number, Area, and Value of Farms in 1900 and 1910.

	1900	1910	Increased per cent
Population	1,485,053	2,377,549	60.1
Number of farms	72,542	88,197	21.6
Land area of state, acres	99,898,880	*99,617,280	----------
Land in farms, acres	28,828,951	27,931,444	†3.1
Improved land in farms, acres	11,958,837	11,389,894	†4.8
Average acre per farm	397.4	316.7	†20.3
Total value of farm property	$796,527,955	$1,614,694,584	102.7
Land	630,444,960	1,317,195,448	108.9
Buildings	77,468,000	133,406,040	72.2
Implements and machinery	21,311,670	36,493,158	71.2
Domestic animals, poultry and bees	67,303,325	127,599,938	89.6
Average value of all property per farm	$10,980.00	$18,308.00	66.7
Average value of land per acre	21.87	47.16	115.6

*Due to the formation of the Salton Sea.

†Decreased. This apparent falling off is due in part to errors in the tabulation in the census of 1900, when certain tracts included in forest reserves in 1910 were included in farm land in 1900.

Summary of Populations and Farms, 1850-1910.

Year	Population	Number of farms	Land in farms		Per cent of land area in farms
			All land	Improved	
1850	92,597	872	3,893,985	32,454	3.9
1860	379,994	18,716	8,730,034	2,468,034	8.8
1870	560,247	23,724	11,427,105	6,218,133	11.5
1880	864,694	35,934	16,593,742	10,669,698	16.7
1890	1,213,398	52,894	21,427,293	12,222,839	21.5
1900	1,485,053	72,542	28,828,951	11,958,837	28.9
1910	2,377,549	88,197	27,931,444	11,389,894	28.0

Value of Farm Property.

The total wealth in the form of farm property is $1,614,695,000, of which 89.8 per cent is contributed by land and buildings, 7.9 per cent by live stock, and 2.3 per cent by implements and machinery. The value of land and buildings is $1,450,601,000, being a little more than double that for 1900. In 1850 the value was only $3,874,000.

The value of the different classes of farm property in 1910 was as follows:

Farm property	Value
Land	$1,317,195,448
Buildings	133,406,040
Implements and machinery	36,493,158
Domestic animals	123,024,652
Poultry	3,844,526
Bees	729,793
Total	$1,614,694,584

Summary of Values, 1850-1910.

Year	Total value	Land and buildings	Implements and machinery	Domestic animals, poultry, and bees
1850	$7,328,582	$3,874,041	$103,483	$3,351,058
1860	86,870,327	48,726,804	2,558,506	35,585,017
1870	184,521,470	141,240,028	5,316,690	37,964,752
1880	*311,997,443	262,051,282	8,447,744	*41,498,417
1890	*777,381,767	697,116,630	14,689,710	*65,575,427
1900	796,527,955	707,912,960	21,311,670	67,303,325
1910	1,614,694,584	1,450,601,488	36,493,158	127,599,938

*Includes estimated value of range animals.

Value of Farm Lands, 1912-1916.

The United States Department of Agriculture estimates the value per acre of farm lands in California and the United States as follows:

Average Value of Plow Lands, per Acre, 1916.

	Average for poor	Average for good	Average for all
California	$50 00	$135 00	$95 00
United States	40 08	72 79	58 39

Average Value of All Farm Lands, per Acre, 1912-1916.

	Without improvements			With improvements		
	1912	1915	1916	1912	1915	1916
California	$70 00	$100 00	$110 00	$107 00	$175 00	$180 00
United States	36 23	40 85	45 55	57 89	64 82	69 45

Size of Farms.

In California there is a great area of semiarid land utilized for grazing purposes only or left unutilized. Upon such lands are located many very large farms or ranches, and these explain the high average acreage per farm. Farms other than those used almost exclusively for grazing are not on the average unusually large, as compared with the average in other states. The average size of the California farm is 316.7 acres, compared with 4,465.6 in 1850; 466.4 in 1860; 481.7 in 1870, since which time it has decreased continually.

Of all the farms in California, 23.4 per cent are from 20 to 49 acres in size, 13.6 per cent from 100 to 174 acres, 13.5 per cent from 10 to 19 acres, and 12.1 per cent from 50 to 99 acres. Thus over three-fifths of all the farms are from 10 to 174 acres in size. About one-fourth are 175 acres or more. The increase in the relative number of the smaller farms in conjunction with the decline in aggregate farm acreage during the last ten years indicates a tendency to subdivide the large farms into smaller ones.

The following table shows the increase or decrease in the size of farms in 1910, as compared with 1900:

Size	Number of farms		Increase or decrease	
	1900	1910	Number	Per cent
Under 3 acres	1,492	1,269	—223	—14.9
3 to 9 acres	5,354	9,324	+3,970	+74.2
10 to 19 acres	8,236	11,932	+3,696	+44.9
20 to 49 acres	13,110	20,614	+7,504	+57.2
50 to 99 acres	8,067	10,680	+2,613	+32.4
100 to 174 acres	13,196	12,015	—1,181	—8.9
175 to 259 acres	4,635	4,689	+54	+1.2
260 to 499 acres	8,370	7,862	—508	—6.1
500 to 999 acres	5,329	5,119	—210	—3.9
1,000 acres and over	4,753	4,693	—60	—1.3
Totals	72,542	88,197	+15,655	+21.6

Summary of Farms by Acreage in California, 1850-1910.

Acreage	1850	1860	1870	1880	1890	1900	1910
Under 3 acres				143	401	1,492	1,269
3 to 9 acres		829	2,187	1,064	2,827	5,354	9,324
10 to 19 acres		1,102	1,086	1,430	4,010	8,236	11,932
20 to 49 acres		2,344	3,064	3,475	7,691	13,110	20,614
50 to 99 acres		2,428	3,224	3,969	5,796	8,067	10,801
100 to 499 acres		6,541	12,248	20,214	24,531	26,201	24,566
500 to 999 acres		538	1,202	3,108	4,367	5,329	5,119
1,000 acres and over		262	713	2,531	3,672	4,753	4,693
Total number of farms	872	18,716	23,724	35,934	53,295	72,542	88,197
Average acres per farm	4,465.6	466.4	481.7	461.8	405.0	397.4	316.7

Size of Farms, Improved and Unimproved, 1850-1910.

Acreage	1850	1860	1870	1880
Total number of acres in farms	3,893,985	8,730,034	11,427,105	16,593,742
Acres of improved land	32,454	2,468,034	6,218,133	10,669,698
Acres of unimproved land	3,861,531	6,262,000	5,208,972	5,924,044
Per cent of farm land improved	0.8	28.3	54.4	64.3

Acreage	1890	1900	1910
Total number of acres in farms	21,427,293	28,828,951	27,931,444
Acres of improved land	12,222,839	11,958,837	11,389,894
Acres of unimproved land	9,204,454	16,870,114	16,541,550
Per cent of farm land improved	57.6	41.5	40.8

Farm Tenure.

The number of all farmers is 88,197. Of these, 6,632 are classed as owners, 3,417 as managers, and 18,148 as tenants.

Of the 66,632 owners, 56,500 operate land owned exclusively by them, while 10,132 operate land which they rent in addition to that which they own. The owners hold 75.5 per cent of all farms, tenants 20.6 per cent, and 3.9 per cent is operated by managers. The percentage of tenants for the state (20.6) is above the average for the Pacific States (17.2), but low in comparison with the percentage for the United States as a whole (37).

Farm Mortgages.

The number of mortgaged farms in 1910 amounted to 40.5 per cent of the total number of 66,632 owned by farmers who own all their land, exclusive of those for which no mortgage report was obtained. The percentage is considerably higher than it was in 1890 and 1900:

Owned farms	Number
Free from mortgage	39,368
Mortgaged	26,749
Unknown	515
Total	66,632

Irrigation of Farm Lands, 1900-1910.

Of the 88,197 farms in the state, 39,352, or rather more than two-fifths (44.6 per cent), are irrigated. The total acreage irrigated is 2,664,104 acres, or 23.4 per cent of the improved land in farms. The enterprises existing in 1910 were capable of supplying water to 3,619,378 acres, and the total acreage included in irrigation projects, completed or under way, was 5,490,360 acres.

The following table shows the number of farms irrigated in comparison with the total number of farms in the state, the total land area, the total land in farms, and the total acreage of improved land in farms, together with the areas not yet irrigated for which water was available, and the acreage included in projects completed or under way:

Land and farms	1900	1910	Increase or decrease	
			Amount	Per cent
Number of all farms	72,542	88,197	15,655	21.6
Approximate land area of state	99,617,280	99,617,280		
Land in farms	28,828,951	27,931,444	—897,507	—3.1
Improved land in farms	11,958,837	11,389,894	—568,943	—4.8
Number of farms irrigated	25,675	39,352	13,677	53.3
Acreage irrigated	1,446,114	2,664,104	1,217,990	84.2
Acreage enterprises capable of irrigating	*	3,619,378		
Acreage included in projects	*	5,490,360		
Percentage irrigated of number of all farms	35.4	44.6	9.2	
Approximate land area of state	1.5	2.7	1.2	
Land in farms	5.0	9.5	4.5	
Improved land in farms	12.1	23.4	11.3	
Excess of acreage enterprises were capable of irrigating over acreage irrigated in 1910		955,274		
Excess of acreage included in projects over acreage irrigated in 1910		2,826,256		

*No record.

TABLE

Number and Size of Farms

Counties	Under 3 acres	3 to 10 acres	10 to 20 acres	20 to 50 acres	50 to 100 acres
Alameda	148	589	405	424	204
Alpine	-----	-----	-----	1	3
Amador	2	13	19	41	52
Butte	2	116	186	321	143
Calaveras	-----	25	14	48	45
Colusa	1	31	35	85	42
Contra Costa	18	118	127	221	158
Del Norte	-----	2	6	9	13
El Dorado	-----	26	21	60	98
Fresno	6	267	598	3,240	951
Glenn	-----	40	33	106	65
Humboldt	10	78	107	280	245
Imperial	51	46	56	182	227
Inyo	2	28	28	55	75
Kern	11	46	57	320	173
Kings	7	69	159	643	377
Lake	1	10	38	85	80
Lassen	-----	9	4	12	32
Los Angeles	438	2,125	1,820	1,709	693
Madera	-----	13	21	76	23
Marin	6	35	54	36	30
Mariposa	-----	1	4	4	21
Mendocino	-----	42	61	166	151
Merced	1	86	213	694	295
Modoc	5	18	13	21	44
Mono	-----	3	1	1	4
Monterey	11	69	71	182	185
Napa	14	136	223	355	226
Nevada	7	61	36	77	69
Orange	28	531	802	1,043	351
Placer	2	52	109	289	206
Plumas	-----	6	5	9	12
Riverside	42	462	596	614	262
Sacramento	12	167	237	321	170
San Benito	7	87	83	118	93
San Bernardino	76	567	918	703	278
San Diego	20	236	345	414	269
San Francisco	69	50	11	15	7
San Joaquin	9	204	531	797	397
San Luis Obispo	7	65	80	179	187
San Mateo	46	81	55	112	61
Santa Barbara	17	130	140	212	164
Santa Clara	68	773	1,186	1,317	562
Santa Cruz	18	226	198	384	293
Shasta	6	16	29	103	111
Sierra	1	6	3	4	5
Siskiyou	1	21	36	88	98
Solano	6	45	60	198	170
Sonoma	40	916	890	1,040	522
Stanislaus	13	153	319	1,046	439
Sutter	-----	57	101	142	91
Tehama	7	34	119	198	102
Trinity	6	9	9	24	23
Tulare	9	171	390	1,247	647
Tuolumne	1	4	15	28	27
Ventura	13	87	120	199	214
Yolo	4	53	115	283	166
Yuba	-----	13	20	33	34
Totals	1,269	9,324	11,932	20,614	10,680

I.

in 1910, by Counties.

100 to 175 acres.	175 to 260 acres	260 to 500 acres	500 to 1,000 acres	1,000 acres and over	Total number of farms	Cost of fertilizers	
						1900	1910
238	116	163	91	44	2,422	$15,180	$17,723
4	9	14	3	8	42	----------	----------
145	64	105	58	38	537	2,140	208
220	127	171	116	98	1,500	21,150	24,935
171	60	127	80	62	632	840	694
90	30	129	104	120	667	8,640	266
256	147	206	140	74	1,465	10,990	1,879
31	11	23	10	9	114	----------	77
212	100	122	52	35	716	2,010	467
609	142	202	119	111	6,245	39,870	34,491
79	31	101	89	119	663	60	906
334	118	147	84	131	1,534	8,750	1,680
400	98	201	51	10	1,322	----------	681
113	41	54	22	20	438	90	221
222	55	116	82	85	1,167	4,420	1,430
287	77	133	42	43	1,837	920	790
144	60	84	53	48	603	170	40
117	51	130	84	63	502	8,700	63
531	192	207	114	85	7,919	200,310	669,152
151	27	66	59	137	573	300	608
35	40	72	111	79	498	4,000	35
97	15	101	51	36	330	420	60
334	131	193	124	154	1,356	5,330	866
165	46	89	100	167	1,856	4,730	3,609
229	68	171	92	75	736	4,280	5
27	12	16	10	17	91	500	----------
263	127	282	225	243	1,658	2,920	1,252
223	92	112	84	72	1,537	12,690	1,290
88	53	84	41	28	544	5,430	932
175	60	86	52	37	3,165	16,520	71,118
174	69	75	50	36	1,062	13,680	7,786
45	19	37	46	42	221	70	260
262	99	166	104	81	2,688	203,010	323,568
223	96	173	111	91	1,601	2,190	15,274
107	56	144	109	117	921	3,620	191
209	70	75	35	18	2,949	151,320	708,516
337	146	246	156	129	2,298	22,980	42,429
4	1	----------	----------	----------	157	5,600	6,031
395	217	371	221	144	3,286	20,750	10,657
267	123	304	288	214	1,714	2,200	1,027
90	52	67	60	41	665	2,070	13,450
185	105	138	93	171	1,355	8,870	8.133
376	141	147	75	86	4,731	25,490	16,703
188	60	52	25	22	1,466	1,450	3,537
300	96	190	93	66	1,010	990	1,086
25	4	19	18	25	110	1.310	140
388	84	199	124	75	1,114	3,890	571
167	89	156	144	108	1,143	17,700	4,142
508	233	299	202	122	4,772	12,030	12,585
192	83	125	142	175	2,687	1,570	23,180
123	84	123	78	74	873	1,000	80
151	51	191	86	139	1,006	15,720	685
148	23	41	15	10	308	170	170
597	198	364	197	201	4,021	8,900	41,765
105	35	88	43	40	386	2,220	1,347
207	142	155	90	66	1,293	8,780	57,432
170	83	189	107	85	1,255	16,110	5,050
82	30	93	64	67	436	1,700	2,765
12,015	4,689	7,862	5,119	4,693	88,197	$937,050	$2,143,993

TABLE II.

Improved and Unimproved Farm Land by Counties, 1910.

Counties	Number of farms	Average acreage of farms	Improved land	Woodland in farms	Other unimproved land	Total land in farms
Alameda	2,422	128.5	177,314	51,484	82,529	311,327
Alpine	42	762.0	7,579	7,597	16,628	32,004
Amador	537	543.3	46,969	114,960	129,801	291,730
Butte	1,500	327.2	247,097	119,126	124,554	490,777
Calaveras	632	429.4	59,104	149,642	62,655	271,401
Colusa	667	783.2	336,509	38,252	147,615	522,376
Contra Costa	1,465	277.4	262,152	28,766	115,515	406,433
Del Norte	114	315.3	12,439	10,574	12,934	35,947
El Dorado	716	294.5	41,682	137,057	32,142	210,881
Fresno	6,245	177.2	590,205	93,194	423,217	1,106,616
Glenn	663	740.9	309,765	67,665	113,768	491;198
Humboldt	1,534	418.9	105,248	174,354	362,934	642,536
Imperial	1,322	169.1	176,069	1,138	46,395	223,602
Inyo	438	251.5	38,698	1,631	69,813	110,142
Kern	1,167	1,202.5	315,387	235,014	852,649	1,403,350
Kings	1,837	203.5	196,569	6,724	170,530	373,823
Lake	603	360.6	42,768	71,388	103,308	217,464
Lassen	502	589.1	122,057	27,688	145,983	295,728
Los Angeles	7,919	95.7	418,998	18,051	320,936	757,985
Madera	573	1,083.2	391,086	41,612	187,965	620,663
Marin	498	529.0	93,115	49,978	120,349	263,442
Mariposa	330	624.4	37,017	85,150	83,892	206.059
Mendocino	1,356	532.0	82,578	247,758	390,989	721,325
Merced	1,856	626.2	607,742	49,818	504,607	1,162,167
Modoc	736	557.2	164,784	75,668	169,682	410,134
Mono	91	1,271.1	43,382	8,303	63,987	115,672
Monterey	1,658	692.0	371,509	140,377	635,530	1,147,416
Napa	1,537	234.6	101,114	193,578	65,888	360,580
Nevada	544	322.4	24,542	48,449	102,407	175,398
Orange	3,165	117.4	189,463	4,476	177,753	371,692
Placer	1,062	233.6	98,608	32,194	117,278	248,080
Plumas	221	607.5	54,281	27,238	52,740	134,259
Riverside	2,688	193.8	278,151	30,231	212,424	520,806
Sacramento	1,601	295.5	275,682	20,964	176,398	473,044
San Benito	921	591.0	186,573	52,466	305,262	544,301
San Bernardino	2,949	70.7	136,625	23,137	48,634	208,396
San Diego	2,298	363.1	234,045	71,020	529,361	834,426
San Francisco	157	13.3	1,562	289	240	2.091
San Joaquin	3,286	232.2	611,762	35,387	115,899	763,048
San Luis Obispo	1,714	926.9	326,928	174,891	1,086,841	1,588,660
San Mateo	665	241.6	100,800	27,334	32,521	160,655
Santa Barbara	1,355	826.9	215,552	276,071	628,852	1,120,475
Santa Clara	4,731	155.3	237,170	153,835	343,814	734,819
Santa Cruz	1,466	107.3	66,875	44,157	46,276	157,308
Shasta	1,010	385.4	96,217	151,113	141,888	389,218
Sierra	110	765.6	30,794	18,168	35,258	84,220
Siskiyou	1,114	409.2	186,147	82,544	187,185	455,876
Solano	1,143	415.5	310,452	44,534	119,880	474,866
Sonoma	4,772	156.0	248,271	278,507	217,866	744,644
Stanislaus	2,687	241.7	512,189	18,756	118,447	649,392
Sutter	873	441.5	199,510	13,956	171,996	385,462
Tehama	1,006	909.8	186,642	206,234	522,351	915,227
Trinity	308	296.5	13,300	31,882	46,128	91,310
Tulare	4,021	259.9	507,024	161,360	376,847	1,045.231
Tuolumne	386	500.2	36,407	62,215	94,450	193,072
Ventura	1,293	425.5	213,868	56,061	280,270	550,199
Yolo	1,255	369.2	317,268	77,576	68,539	463,383
Yuba	436	571.3	94,250	70,175	84,683	249,108
Totals	88,197	av. 316.7	11,389,894	4,541,767	11,999,783	27,931,444

TABLE III.

Mortgage Debt on Farms Operated by Owners in 1910.*

Counties	Number free from mortgage	Number with mortgage	Number with no mortgage	Farms consisting of owned land only			
				Number reporting debt	Value of their land and buildings	Amount of mortgage	Per cent value of land and buildings
Alameda	1,204	467	19	384	$3,691,870	$958,687	26.0
Alpine	22	10	--------	8	87,050	30,800	35.4
Amador	364	72	1	62	347,628	86,515	24.9
Butte	745	470	15	385	3,325,191	807,233	24.3
Calaveras	456	95	5	71	357,205	95,080	26.6
Colusa	251	196	2	123	1,443,045	444,355	30.8
Contra Costa	642	243	5	184	2,122,140	574,965	27.1
Del Norte	59	20	--------	16	137,300	44,900	32.7
El Dorado	492	145	5	127	567,100	161,873	28.5
Fresno	2,072	3,128	27	2,734	24,983,327	6,388,563	25.6
Glenn	291	220	1	170	1,703,360	403,568	23.7
Humboldt	687	293	11	230	2,436,615	611,134	25.1
Imperial	584	236	4	194	2,867,600	697,384	24.3
Inyo	254	106	1	96	1,184,200	277,142	19.2
Kern	530	311	5	256	2,764,650	751,974	27.2
Kings	642	747	2	587	5,888,820	1,541,990	26.2
Lake	346	132	6	107	847,400	213,200	25.2
Lassen	290	122	2	108	1,464,400	272,163	18.6
Los Angeles	3,176	2,321	102	1,889	31,540,310	6,465,025	20.5
Madera	294	114	11	77	1,182,365	190,817	16.1
Marin	118	73	5	65	664,175	259,074	39.0
Mariposa	242	39	11	35	250,720	52,275	20.8
Mendocino	796	266	7	225	1,832,841	453,647	24.8
Merced	613	782	10	584	6,570,345	1,409,143	21.4
Modoc	432	159	3	130	1,786,230	354,669	19.9
Mono	63	12	--------	10	230,900	52,350	22.7
Monterey	749	295	19	222	3,002,171	755,391	25.2
Napa	750	411	5	358	2,905,375	745,253	25.7
Nevada	398	76	2	63	260,165	56,270	21.6
Orange	1,294	1,228	9	957	12,557,760	2,934,955	23.4
Placer	478	269	1	217	1,614,735	371,680	23.0
Plumas	131	51	1	43	566,940	113,354	20.0
Riverside	1,279	996	16	816	11,969,410	2,953,463	24.7
Sacramento	673	326	12	273	3,894,145	840,241	21.6
San Benito	385	262	6	210	2,354,830	767,233	32.6
San Bernardino	1,344	1,178	10	961	17,434,500	3,958,213	22.7
San Diego	1,339	501	5	342	3,235,500	732,270	22.6
San Francisco	57	14	11	9	126,600	30,250	23.9
San Joaquin	1.181	1,172	17	887	8,729,605	2,272,853	26.0
San Luis Obispo	710	341	5	193	1,779,070	489,925	27.5
San Mateo	249	47	6	39	610,350	103,505	17.0
Santa Barbara	533	227	4	134	2,790,140	706,315	25.3
Santa Clara	2,092	1,500	30	1,186	11,700,415	3,391,948	29.0
Santa Cruz	671	410	7	357	3,667,630	815,705	22.2
Shasta	658	177	4	147	919,980	211,200	23.0
Sierra	72	21	--------	17	160,500	48,350	30.1
Siskiyou	688	251	9	210	2,760,855	683,580	24.8
Solano	441	328	4	237	3,732,565	992,293	26.6
Sonoma	2,254	1,498	19	1,399	11,018,235	3,009,142	27.3
Stanislaus	890	1,301	9	972	9,721,155	2,394,773	24.6
Sutter	362	307	5	225	3,076,708	785,106	25.5
Tehama	518	288	4	241	2,061,515	543,342	26.4
Trinity	233	40	1	36	221,425	51,498	23.3
Tulare	1,778	1,511	18	1,197	15,911,023	3,263,701	20.5
Tuolumne	269	71	2	63	378,650	98,677	26.1
Ventura	497	393	5	229	6,013,275	1,098,618	18.3
Yolo	482	397	8	283	4,329,746	1,154,656	26.7
Yuba	248	83	1	50	417,430	114,374	27.4
Totals	39,368	26,749	515	21,430	$250,199,190	$60,036,660	24.0

*No mortgage reports were secured for farms operated by tenants or managers.

PART II.

POPULATION OF CALIFORNIA.

Population 1850–1916; Indians of California; Density of Population; Population of Municipalities of 8,000 and Upwards; Cities of 2,500 to 6,000; Urban and Rural Population; Blind Population; Mortality Statistics; Estimated Population of Cities and Towns, 1915; Population by Counties, 1850-1910; White and Colored Population; Foreign-born Population; Japanese Farmers, 1912; Color and Nativity of Farmers.

The first settlement in California was made by the Spaniards in 1769, when the Franciscan Fathers founded a mission at San Diego. In 1776 the Mission Dolores was established where San Francisco now stands. California was under Spanish rule until 1822, when, at the termination of the Mexican revolution, it declared its allegiance to Mexico. For several years prior to 1846 large numbers of immigrants from the United States had been arriving in California, and in June of that year a revolt against Mexico was begun by the American settlers. In July and August the American flag was raised at Monterey, San Francisco, Sonoma, Sacramento, San Jose, San Diego, Santa Barbara, Los Angeles, and other places.

The end of the war in Mexico took place January, 1847, and in February, 1848, California was ceded to the United States. From 1846 to 1849 California was under military and provisional rule by the United States. In October, 1849, a state constitution was adopted at Monterey, and on September 9, 1850, California became a state of the Union.

Population of California, 1850-1916.

Year	Population	Increase over preceding census	
		Number	Per cent
1850	92,597	------------	------------
1860	379,994	287,397	310.4
1870	560,247	180,253	47.4
1880	864,694	304,447	54.3
1890	*1,213,398	348,704	40.3
1900	1,485,053	271,655	22.4
1910	2,377,549	892,496	60.1
1916 (estimated)	2,938,654	------------	------------

*Includes population of Indian reservations (5,268).

During each decade since 1850, the population of California has increased more rapidly than that of continental United States. The population of the state in 1910 was more than twenty-five times as large as in 1850, while the population of the continental United States was a little less than four times that in 1850.

Rank in Population of the Fifty States and Territories.

California ranked twenty-ninth in 1850, twenty-sixth in 1860, twenty-fourth in 1870 and 1880, twenty-second in 1890, twenty-first in 1900, and twelfth in 1910.

The Density of Population per Square Mile. 1850-1910.

1850	1860	1870	1880	1890	1900	1910
.6	2.4	3.6	5.5	7.8	9.5	15.3

The density of population in California is low, the average number of persons to the square mile in 1910 being 15.3; and the estimated number in 1916, 18.9. The average number per square mile for continental United States in 1910 was 30.9. This compares with 508.8 in Rhode Island, 418.8 in Massachusetts, 337.7 in New Jersey, 191.2 in New York, 342.4 in the United Kingdom, and 213.3 in India. The Australian commonwealth has only 1.39 to the square mile, New Zealand 7.8, and Canada 1.4; 589 in Belgium, 436 in Holland, 188 in France, and 270 in Germany.

Population of Municipalities Having 8,000 or More Population April 15, 1910, and July 1, 1916, and Land Area on July 1, 1915.

Municipality	Land area, in acres, July 1, 1915	Census		
		June 1, 1900	Apr. 15, 1910	1916
Alameda	4,149.3	16,464	23,383	27,732
Bakersfield	3,680.0	6,127	12,727	16,874
Berkeley	5,280.0	13,214	40,434	57,653
Eureka	3,734.2	7,327	11,845	14,684
Fresno	3,913.0	12,470	24,892	34,958
Long Beach	8,435.2	2,252	17,809	27,587
Los Angeles	183,464.0	104,266	*319,198	503,812
Oakland	31,591.0	66,960	150,174	198,604
Pasadena	8,460.8	9,117	30,291	46,450
Pomona	8,000.0	5,526	10,207	13,150
Redlands	10,300.0	4,797	10,449	14,000
Riverside	25,088.0	7,973	15,212	19,763
Sacramento	8,900.0	29,282	44,696	66.895
San Bernardino	4,321.0	6,150	12,779	16,945
San Diego	47,323.1	17,700	39,578	53,330
San Francisco	26,632.0	342,782	416,912	463,516
San Jose	5,399.6	21,500	28,946	38,902
Santa Ana	5,760.0	4,933	8,429	10,627
Santa Barbara	6,510.0	6,587	11,659	14,846
Santa Cruz	5,760.0	5,659	11,146	14,594
Stockton	5,141.0	17,506	23,253	35,358
Vallejo	2,484.0	7,965	11,340	13,461

*Includes the population of San Pedro city, annexed in 1909.

San Francisco, the largest city, had a population in 1910 of 416,912, and Los Angeles, the second city, a population of 319,198. Oakland, with 150,174 inhabitants, is the only other city in the state having over 100,000 inhabitants. The following eight cities had over 25,000 inhabitants in 1910:

City	Population, 1910	Increase over preceding census	Per cent
Berkeley	40,434	27,220	206.0
Los Angeles	319,198	216,719	211.5
Oakland	150,174	83,214	124.3
Pasadena	30,291	21,174	232.2
Sacramento	44,696	15,414	52.6
San Diego	39,578	21,878	123.6
San Francisco	416,912	74,130	21.6
San Jose	28,946	7,446	34.6

Cities of 2,500 to 6,000 (24) in 1910.

Richmond	6,802	Redding	3,572
Petaluma	5,880	Corona	3,540
San Luis Obispo	5,157	Red Bluff	3,530
Alhambra	5,021	San Leandro	3,471
Hanford	4,829	Redondo Beach	2,935
Grass Valley	4,520	Glendale	2,746
Palo Alto	4,486	Hayward	2,746
Coalinga	4,199	Porterville	2,696
Colton	3,980	Anaheim	2,628
Oroville	3,859	Emeryville	2,613
Chico	3,750	Roseville	2,608
Salinas	3,736	Oxnard	2,555

California has 58 counties, the population ranging from 309 in Alpine to 504,131 in Los Angeles County.

Two territorial changes have taken place since 1900: The eastern portion of San Diego County was taken into Imperial County in 1907, and part of Fresno County was annexed to Kings County in 1909.

Ten counties have decreased in population during the decade 1900-1910, the rates of decrease ranging from 5.8 per cent in Mono County, to 39.3 in Alpine County, and a decrease from 125 in Mono County to 2,834 in Nevada County.

San Bernardino County, with 20,157 square miles, has the largest area; San Francisco County, coextensive with San Francisco city, with 43 square miles and 9,695.6 persons per square mile, has the smallest area and the highest density. Alpine, Inyo, and Mono counties each average less than one person per square mile. In 1910 the urban territory of the state. or the cities and incorporated towns of 2,500 or more, contained 61.8 per cent of the total population, while 38.2 per cent lived in rural territory.

Urban and Rural Population.

The urban territory of the state in 1910—that is, the cities and incorporated towns of 2,500 or more—contained 1,469,739 inhabitants, or 61.8 per cent of the total population, while 907,810 inhabitants, or 38.2 per cent, lived in rural territory.

In 128 places of less than 2,500 inhabitants each have an aggregate population of 153,052, or 6.4 per cent of the total population of the state. In 1910, therefore, the urban population was 1,469,739 and the rural territory 907,810, the latter made up as follows: Cities and towns of less than 2,500, 153,052; other rural territory 704,758, or a total of 907,810.

White and Colored Population.

Three municipalities having 8,000 or more population in 1910, had 10,000 or more colored, or at least ten per cent of their population colored.

Municipality	Census 1910		Estimated, 1916	
	White	Colored	White	Colored
San Francisco	400,014	16,898	446,937	16,579
Los Angeles	305,307	13,891	481,989	21,823
Riverside	13,506	1,706	17,368	2,395

BLIND POPULATION IN CALIFORNIA.

(Census Report of 1910.)

Years	Male	Female	Total	Years	Male	Female	Total
Under 1	--------	1	1	50 to 54	73	20	93
1 to 4	2	2	4	55 to 59	53	23	76
5 to 9	6	6	12	60 to 64	93	22	115
10 to 14	20	16	36	65 to 69	99	27	126
15 to 19	32	28	60	70 to 74	66	41	107
20 to 24	26	19	45	75 to 79	85	46	131
25 to 29	27	10	37	80 to 84	71	42	113
30 to 34	34	15	49	85 and over	56	48	104
35 to 39	36	12	48	Age not reported	2	2	4
40 to 44	52	20	72				
45 to 49	75	21	96	Totals	908	421	1,329

MORTALITY STATISTICS.

The number of deaths of all ages in the registration area and its subdivisions in 1914, amounted to 37,542, or 35,495 white, and 2,047 colored, according to the following summary:

Years	Number of deaths	Years	Number of deaths
Under 1 year	3,956	45 to 49	2,132
1 year	771	50 to 54	2,449
2 years	421	55 to 59	2,368
3 years	260	60 to 64	2,652
4 years	184	65 to 69	2,742
Under 5 years	5,592	70 to 74	2,833
5 to 9	641	75 to 79	2,462
10 to 14	435	80 to 84	1,829
15 to 19	716	85 to 89	860
20 to 24	1,417	90 to 94	298
25 to 29	1,818	95 to 99	60
30 to 34	1,959	100 years and over	15
35 to 39	2,091	Deaths at unknown age	16
40 to 44	2,157		

SUICIDE.—In 1914, as in other years, in well over half of the deaths charged to this heading, the means used were poison and firearms. Among the registration states the highest rate was that for California (33.4 per 100,000 population). Next in order were Montana, with 28.9, Washington, 21.5, and Connecticut, 21. The lowest rates were those for North Carolina, 6.6, Virginia, 7.2, Kentucky, 9.9, Kansas 11.3 and New Hampshire, 12.5.

ESTIMATED POPULATIONS OF CITIES AND TOWNS IN 1915.

The populations of the various cities of the state are based upon estimates. It is not claimed that they are correct, but presumably they are approximately so—at any rate they are as near the mark as the various city clerks or auditors can hit it after careful investigation.

The difference in the totals as ascertained by three methods is not great, 150,000 separating the highest from the lowest, as follows:

School census method	3,004,000
Registered vote method	2,878,470
United States census method	2,854,727

On the basis of the percentage of increase according to the census bureau's method, the rural population of the state should be 837,781. The cities claim 2,450,181. The two figures give a total of 3,287,962, which exceeds the highest estimate by any of three methods indicated.

The total numbers for the state are probably approximately correct, but as regards cities and towns, the estimated increase is in many cases too high. Some are rapidly increasing, but the population of others is more or less stationary, and in some cases on the decline. During the decade between 1900 and 1910 ten counties showed a decrease in population, the rates of decrease ranging from 5.8 per cent in Mono County to 39.3 per cent in Alpine County, and the absolute decreases from 125 in Mono County to 2,834 in Nevada County.

Estimated Population of Cities and Towns in California on June 30, 1915.*

City	Population per 1910 census	Estimated population June 30, 1915	City	Population per 1910 census	Estimated population June 30, 1915
Alameda	23,383	30,000	Eureka	11,845	15,000
Albany	808	1,900	Exeter		2,000
Alhambra	5,021	9,000	Fairfield	834	1,000
Alturas	916	1,500	Ferndale	905	1,000
Alviso	402	550	Fillmore		1,700
Amador	1,009	1,100	Firebaugh	450	600
Anaheim	2,628	4,178	Fort Bragg	2,408	3,000
Angels		2,500	Fort Jones	316	500
Antioch	1,124	2,000	Fortuna	883	1,150
Arcadia	696	1,050	Fowler	675	1,250
Arcata	1,121	1,600	Fresno	24,892	45,000
Arroyo Grande		1,200	Fullerton	1,725	3,300
Auburn	2,376	2,366	Gilroy	2,437	2,900
Avalon		750	Glendale	2,746	7,556
Azusa	1,477	2,000	Glendora	1,000	2,200
Bakersfield	12,727	19,220	Grass Valley	4,520	5,100
Banning		1,500	Gridley	987	1,800
Beaumont		750	Hanford	4,829	6,250
Belvedere	481	550	Hayward	2,746	4,000
Benicia	2,360	2,400	Healdsburg	2,011	3,000
Berkeley	40,434	60,000	Hemet	992	1,800
Beverly Hills		590	Hercules	279	380
Biggs	403	500	Hermosa Beach	679	2,000
Bishop	1,190	1,750	Hillsborough		900
Blue Lake	507	614	Hollister	2,308	2,500
Brawley	881	3,000	Holtville	729	2,000
Burbank		2,000	Huntington Beach	815	2,500
Burlingame	1,565	3,750	Huntington Park	1,299	3,500
Calexico	797	3,000	Imperial	1,257	3,000
Calistoga	751	900	Inglewood	1,536	3,500
Chico	3,750	6,200	Jackson	2,035	2,500
Chino	1,444	2,200	Kennett	1,714	1,500
Chula Vista		2,000	King		1,050
Claremont	1,114	1,500	Kingsburg	634	1,325
Cloverdale	823	1,100	La Mesa	1,200	1,400
Clovis	1,000	1,500	Lakeport	870	1,100
Coalinga	4,199	2,500	Larkspur	594	2,000
Colfax	621	1,050	Lemoore	1,000	2,000
Colusa	1,582	2,000	Lincoln	1,402	1,500
Colton	3,980	5,500	Lindsay	1,814	2,500
Compton	922	1,500	Livermore	2,030	2,450
Concord	703	750	Lodi	2,697	4,200
Coram	666	150	Lompoc	1,482	1,650
Corcoran		700	Long Beach	17,809	32,252
Corning	972	2,100	Lordsburg	954	1,650
Corona	3,540	5,000	Los Angeles	319,198	550,000
Coronado	1,477	3,600	Los Banos	745	1,000
Covina	1,652	2,500	Los Gatos	2,232	2,250
Crescent City	1,114	1,200	Loyalton	983	600
Daly City		5,000	McKittrick	1,500	500
Delano		575	Madera	2,404	3,300
Dinuba	970	1,900	Manhattan Beach		1,500
Dixon	827	1,200	Maricopa		1,750
Dorris	214	420	Martinez	2,115	3,000
Dunsmuir	1,719	2,200	Marysville	5,430	6,000
Eagle Rock	1,000	1,800	Mayfield	1,041	1,080
East San Diego		4,500	Merced	3,102	4,000
El Cajon		600	Mill Valley	2,551	3,000
El Centro	1,610	6,000	Modesto	4,034	7,200
El Monte		1,200	Monrovia	3,576	5,500
El Paso de Robles	1,441	1,800	Montague	274	450
Elsinore	488	700	Monterey	4,923	5,000
Emeryville	2,613	2,950	Morgan Hill	607	660
Escondido	1,334	2,000	Mountain View	1,161	1,400
Etna	518	518	Napa	5,791	6,500

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*From the Report of the State Controller, 1915.

Estimated Population of Cities and Towns in California on June 30, 1915.*

City	Population per 1910 census	Estimated population June 30, 1915
National City	1,733	3,400
Needles		3,500
Nevada City	2,689	3.000
Newman	892	1,100
Newport Beach	445	1,500
Oakdale	1.035	1.500
Oakland	150,174	185,000
Oceanside	673	1,100
Ontario	4,274	7,000
Orange	2,920	4,500
Orland	836	1,300
Oroville	3,859	3,300
Oxnard	2,555	3,500
Pacific Grove	2,384	2,500
Palo Alto	4,486	6,000
Pasadena	30,291	39,000
Perris	1,441	900
Petaluma	5,880	7,500
Piedmont	1,719	3,200
Pinole	798	1,500
Pittsburg	2,372	4.000
Placerville	1,914	2,150
Pleasanton	1,254	1,300
Point Arena	497	500
Pomona	10,207	14.500
Porterville	2,696	4,000
Potter Valley	576	830
Red Bluff	3.530	5.072
Redding	3,572	4.800
Redlands	10.449	11,500
Redondo Beach	2,935	4,750
Redwood City	2,442	3,500
Reedley	1,386	2,200
Rialto	1,000	1,300
Richmond	6,802	16,000
Rio Vista	884	1,000
Riverside	15,212	19.000
Rocklin	1.026	1,000
Roseville	2,608	4,500
Ross	556	875
Sanger		2,600
Sacramento	44,696	75,000
Salinas	3,736	5,000
San Anselmo	1,531	3,500
San Bernardino	12,779	18,000
San Buenaventura	2,945	3,500
San Bruno		1,500
San Diego	39,578	90,000
San Fernando		2,400
San Francisco	416,912	530,000
San Gabriel		1,700
San Jacinto	898	1,250
San Jose	28,946	34,000
San Juan	326	550
San Leandro	3,471	4,500
San Luis Obispo	5,157	6,500
San Marino		550
San Mateo	4,384	6,000
San Rafael	5,934	6,000
Santa Ana	8,429	14,500
Santa Barbara	11,659	15,000
Santa Clara	4,348	6,000
Santa Cruz	11,146	13.600
Santa Maria	2,260	2,750
Santa Monica	7,847	12,000
Santa Paula	2,216	3,100
Santa Rosa	7,817	11,000
Sausalito	2,383	2,500
Sawtelle	2,143	4,500
Sebastopol	1,233	1,900
Selma	1,750	2,500
Sierra Madre	1,303	1,750
Sisson	636	500
Sonoma	957	1,280
Sonora	2,029	2,029
South Pasadena	4,649	7,500
South San Francisco	1,989	3,500
St. Helena	1,603	1,800
Stanton		575
Stockton	23,253	42,000
Suisun	641	800
Sunnyvale		1,650
Susanville	688	1,000
Sutter Creek		1,300
Taft		3,500
Tehachapi	385	500
Tehama	221	300
Tropico		3,000
Tracy	1,129	2.500
Tulare	2,758	3,200
Turlock	1,573	3.200
Ukiah	2,136	2,600
Upland	2,384	3.000
Vacaville	1,177	1,250
Vallejo	11,340	15,000
Venice	3,219	8.500
Vernon	772	1,350
Visalia	4,550	6,000
Walnut Creek	450	600
Watsonville	4,446	6,000
Watts	1,922	3,500
Wheatland	481	500
Whittier	4,550	7,536
Willits	1,153	2,300
Willows	1,139	3,000
Winters	910	1,200
Woodland	3,187	5,000
Yreka	1,134	1.500
Yuba City	1,160	1,700
Totals	1,634,805	2,450,181

*From the Report of the State Controller, 1915.

TABLE IV.

Population in California by Counties, 1850-1910.

Counties	1850	1860	1870	1880	1890	1900	1910
Alameda		8,927	24,237	62,976	93,864	130,197	246,131
Alpine			685	539	667	509	309
Amador		10,930	9,582	11,384	10,320	11,116	9,086
Butte	3,574	12,106	11,403	18,721	17,939	17,117	27,301
Calaveras	16,884	16,299	8,895	9,094	8,882	11,200	9,171
Colusa[1]	115	2,274	6,165	13,118	14,640	7,364	7,732
Contra Costa[2]		5,328	8,461	12,525	13,515	18,046	31,674
Del Norte[3]		1,993	2,022	2,584	2,592	2,408	2,417
El Dorado	20,057	20,562	10,309	10,683	9,232	8,986	7,492
Fresno[4]		4,605	6,336	9,478	32,026	37,862	75,657
Glenn[1]						5,150	7,172
Humboldt[5]		2,694	6,140	15,512	23,469	27,104	33,857
Imperial[11]							13,591
Inyo			1,956	2,928	3,544	4,377	6,974
Kern			2,925	5,601	9,808	16,480	37,715
Kings[6]						9,871	16,230
Klamath[7]		1,803	1,686				
Lake			2,969	6,596	7,101	6,017	5,526
Lassen			1,327	3,340	4,239	4,511	4,802
Los Angeles[8]	3,530	11,333	15,309	33,381	101,454	170,298	504,131
Madera[4]						6,364	8.368
Marin	323	3.334	6,903	11,324	13,072	15,702	25,114
Mariposa	4,379	6,243	4,572	4,339	3,787	4,720	3,956
Mendocino	55	3,967	7,545	12,800	17,612	20,465	23,929
Merced		1,141	2,807	5,656	8,085	9,215	15,148
Modoc				4,399	4,986	5,076	6,191
Mono			430	7,499	2,002	2,167	2,042
Monterey	1,872	4,739	9,876	11,302	18.637	19,380	24,146
Napa	405	5,521	7,163	13,235	16,411	16,451	19,800
Nevada		16,446	19,134	20,823	17,369	17,789	14,955
Orange[8]					13,589	19,696	34,436
Placer		13,270	11,357	14,232	15,101	15,786	18,237
Plumas		4,363	4,489	6,180	4,933	4,657	5,259
Riverside[9]						17,897	34,696
Sacramento	9,087	24,142	26,830	34,390	40,339	45,915	67,806
San Benito				5,584	6,412	6,633	8,041
San Bernardino[9]		5,551	3,988	7,786	25,497	27,929	56,706
San Diego[9]	798	4,324	4,951	8,618	34,987	35,090	61,665
San Francisco[2]		56,802	149,473	233,959	298,997	342,782	416,912
San Joaquin	3,647	9,435	21,050	24,349	28,629	35,452	50,731
San Luis Obispo	336	1,782	4,772	9,142	16,072	16,637	19,383
San Mateo		3,214	6,635	8,669	10,087	12,094	26,585
Santa Barbara	1,185	3,543	7,784	9,513	15,754	18,934	27,738
Santa Clara[2]		11,912	26,246	35,039	48,005	60,216	83,539
Santa Cruz	643	4,944	8,743	12,802	19,270	21,512	26,140
Shasta	378	4,360	4,173	9,492	12,133	17,318	18,920
Sierra		11,387	5,619	6,623	5,051	4,017	4,098
Siskiyou[10]		7,629	6,848	8,610	12,163	16,962	18,801
Solano	580	7,169	16,871	18,475	20,946	24,143	27,599
Sonoma	560	11,867	19,819	25,926	32,721	38,480	48,394
Stanislaus		2,245	6,499	8,751	10,040	9,550	22,522
Sutter	3,444	3,390	5,030	5,159	5,469	5,886	6,328
Tehama		4,044	3,587	9,301	9,916	10,996	11,401
Trinity	1,635	5,125	3,213	4,999	3,719	4,383	3,301
Tulare[6]		4,638	4,533	11,281	24,574	18,375	35,440
Tuolumne	8,351	16,229	8,150	7,848	6,082	11,166	9,979
Ventura				5,073	10,071	14,367	18,347
Yolo	1,086	4,716	9,899	11,772	12,684	13,618	13,926
Yuba	9,673	13,668	10,851	11,284	9,636	8,620	10,042
Totals	92,597	379,994	560,247	864,694	1,208,130	1,485,053	2,377,549

[1] Glenn organized from part of Colusa in 1892. [2] The returns for 1850 for Contra Costa and Santa Clara were lost, and those for San Francisco were destroyed by fire. [3] Part annexed to Siskiyou between 1880 and 1890. [4] Madera organized from part of Fresno in 1893, and another part of Fresno County annexed to Kings in 1909. [5] Part of Klamath annexed in 1874. [6] Kings organized from part of Tulare in 1893, enlarged by annexation of part of Fresno County in 1909. [7] Annexed to Humboldt and Siskiyou in 1874. [8] Orange organized from part of Los Angeles in 1889. [9] Riverside organized from part of San Bernardino and San Diego in 1893. [10] Part of Klamath annexed in 1874, and part of Del Norte annexed between 1880 and 1890. [11] Organized from part of San Diego County in 1907.

TABLE V.

White and Colored Population by Counties, 1900.

Counties	Population, 1900				
	White	Negro	Indian	Chinese	Japanese
Alameda	125,432	1,334	71	2,211	1,149
Alpine	359	3	142	5	----------
Amador	10,805	28	130	153	----------
Butte	15,733	106	201	712	365
Calaveras	10,879	69	100	148	4
Colusa	6,840	76	121	274	53
Contra Costa	17,088	47	8	627	276
Del Norte	2,138	1	269	----------	----------
El Dorado	8,513	99	138	206	30
Fresno	34,570	399	520	1,775	598
Glenn	4,867	18	24	227	14
Humboldt	25,359	12	1,728	5	----------
Imperial	----------	----------	----------	----------	----------
Inyo	3,355	15	940	67	----------
Kern	14,974	208	344	906	48
Kings	9,171	76	51	417	156
Lake	5,492	12	428	82	3
Lassen	4,099	1	381	28	2
Los Angeles	163,975	2,841	69	3,209	204
Madera	5,664	51	401	229	19
Marin	14,999	137	25	489	52
Mariposa	4,410	35	173	102	----------
Mendocino	18,833	38	1,353	218	23
Merced	8,780	31	4	357	43
Modoc	4,560	7	503	6	----------
Mono	1,656	1	389	120	1
Monterey	17,707	80	26	857	710
Napa	15,857	29	18	541	6
Nevada	17,024	70	48	632	15
Orange	19,459	98	----------	136	3
Placer	14,494	35	74	1,050	133
Plumas	4,018	3	444	192	----------
Riverside	16,421	254	809	316	97
Sacramento	40,917	511	24	3,254	1,209
San Benito	6,456	57	36	69	15
San Bernardino	26,605	216	572	388	148
San Diego	32,048	406	2,197	414	25
San Francisco	325,378	1,654	15	13,954	1,781
San Joaquin	32,941	322	1	1,875	313
San Luis Obispo	16,389	77	1	154	16
San Mateo	11,652	89	1	306	46
Santa Barbara	18,256	33	72	459	114
Santa Clara	57,934	251	9	1,738	284
Santa Cruz	20,515	81	67	614	235
Shasta	16,131	203	862	102	20
Sierra	3,669	7	31	309	1
Siskiyou	15,646	38	480	790	8
Solano	22,267	101	2	903	870
Sonoma	37,385	32	316	599	148
Stanislaus	9,223	61	25	236	5
Sutter	5,451	34	20	226	155
Tehama	9,878	147	99	729	143
Trinity	3,803	9	234	336	1
Tulare	17,709	73	175	370	48
Tuolumne	10,804	53	149	158	2
Ventura	13,826	34	5	408	94
Yolo	12,662	172	28	346	410
Yuba	7,651	170	24	719	56
Totals	1,402,727	11,045	15,377	45,753	10,151

TABLE VI.

White and Colored Population by Counties, 1910.

Counties	White	Negro	Indian	Chinese	Japanese	Total*
Alameda	234,520	3,634	41	4,588	3,266	246,131
Alpine	213	----------	94	1	1	309
Amador	8,838	2	143	101	2	9,086
Butte	25,684	122	298	572	295	27,301
Calaveras	8,941	17	161	49	3	9,171
Colusa	7,155	50	169	218	140	7,732
Contra Costa	29,911	67	3	550	1,009	31,674
Del Norte	2,078	1	337	1	----------	2,417
El Dorado	7,198	28	177	58	31	7.492
Fresno	71,215	474	313	1,377	2,233	75,657
Glenn	6,915	15	32	129	33	7,172
Humboldt	32,153	40	1,652	6	6	33,857
Imperial	12,582	65	682	32	217	13,591
Inyo	6,020	21	792	100	41	6,974
Kern	36,007	369	220	841	273	37,715
Kings	15,366	172	32	358	293	16,230
Lake	5,055	11	433	24	3	5,526
Lassen	4,372	1	410	13	6	4,802
Los Angeles	483,478	9,424	97	2,602	8,461	504,131
Madera	7,650	56	419	211	32	8,368
Marin	24,186	145	26	555	199	25,114
Mariposa	3,674	18	192	69	3	3,956
Mendocino	22,310	31	1,170	263	77	23,929
Merced	14,697	75	----------	278	98	15,148
Modoc	5,629	4	546	11	1	6,191
Mono	1,621	----------	386	21	14	2,042
Monterey	22,135	107	29	575	1,121	24,146
Napa	19,437	48	6	205	103	19.800
Nevada	14,558	14	52	309	22	14,955
Orange	33,589	97	21	83	641	34,436
Placer	16,572	55	102	612	862	18,237
Plumas	4,629	5	380	105	20	5,259
Riverside	31,613	518	1,590	187	765	34,696
Sacramento	61,040	631	62	2,143	3,874	67,806
San Benito	7,643	26	----------	66	286	8,041
San Bernardino	54,153	642	573	284	946	56,706
San Diego	58,514	684	1,516	430	520	61,665
San Francisco	400,014	1,642	46	10,582	4,518	416,912
San Joaquin	46,339	307	8	1,968	1,804	50.731
San Luis Obispo	18,693	77	14	165	434	19,383
San Mateo	25,821	67	1	309	358	26,585
Santa Barbara	26,282	108	45	440	863	27,738
Santa Clara	79,849	262	16	1,064	2,299	83,539
Santa Cruz	25,159	83	15	194	689	26,140
Shasta	17,873	159	756	88	42	18,920
Sierra	3,910	----------	54	117	17	4,098
Siskiyou	17,413	29	1,109	226	24	18,801
Solano	25,432	250	1	811	894	27,559
Sonoma	47,167	43	340	287	554	48,394
Stanislaus	22,129	89	30	161	113	22,522
Sutter	6,012	10	18	79	134	6,328
Tehama	10,809	91	94	309	98	11,401
Trinity	2,903	8	227	163	----------	3,301
Tulare	34,159	190	204	257	615	35,440
Tuolumne	9,698	14	186	75	6	9,979
Ventura	17,132	64	3	235	872	18,347
Yolo	12,618	280	32	198	789	13,926
Yuba	8,909	203	16	493	336	10,042
Totals	2,259,672	21,645	16,371	36,248	41,356	2,377,549

*Not including 1,948 Hindus, 304 Koreans, and 5 Filipinos.

TABLE VII.

Foreign-Born Population in California, 1860-1900.

Country of birth	1860	1870	1880	1890	1900
Africa	12	48	86	139	168
Asia[1]	346	56	16	164	235
Atlantic islands	121	943	3,356	2,587	3,515
Australia	896	1,593	2,350	1,905	2,269
Austria	727	1,078	1,948	3,687	5,356
Belgium	299	291	1,092	663	785
Bohemia	---	90	239	243	504
Canada	5,437	10,660	18,889	26,028	29,818
Central America	100	124	188	309	481
China	34,935	48,790	73,548	71,066	40,262
Cuba	---	45	182	---	93
Denmark	1,328	1,837	3,748	7,764	9,040
England	12,227	17,774	24,722	35,503	35,746
Europe[2]	33	56	109	194	59
Finland	---	---	---	---	2,763
France	8,462	8,068	9,550	11,855	12,256
Germany	20,919	29,701	42,532	61,472	72,449
Greece	93	97	170	259	372
Holland	439	452	694	760	1,015
Hungary	---	102	216	369	799
India	---	63	155	202	263
Ireland	33,147	54,421	62,962	63,138	44,476
Italy	2,987	4,660	7,537	15,495	22,777
Japan	---	32	133	1,224	10,264
Luxemburg	---	11	97	24	42
Mexico	9,150	9,339	8,648	7,164	8,086
Norway	715	1,000	1,765	3,702	5,060
Pacific islands[3]	334	93	173	1,296	1,089
Poland	730	804	1,026	914	1,220
Portugal	1,459	2,508	4,705	9,859	12,068
Roumania	---	---	---	---	73
Russia	260	540	1,013	3,140	3,421
Scotland	3,670	4,949	6,465	9,299	9,467
South America	2,250	1,940	1,797	1,366	1,137
Spain	470	405	572	836	896
Sweden	1,405	1,944	4,209	10,923	14,549
Switzerland	1,714	2,927	5,308	9,743	10,974
Turkey	13	17	36	202	649
Wales	1,262	1,517	1,920	1,860	1,949
West Indies[4]	304	349	528	670	372
Other countries	181	289	20	8	260
Born at sea	---	142	170	277	358
Totals	146,528	209,831	292,874	366,309	[5]367,240

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[1] Except China, Japan, and India. [2] Not otherwise specified. [3] Except Philippine Islands. [4] Except Cuba and Porto Rico. [5] Of this number (367,240) 123,725 were English speaking from United Kingdom, Australia, and Canada.

TABLE VIII.

Foreign-Born White Population in California in 1910.

Country*	White population of foreign birth or foreign parentage			
	Fortign born	Native, both parents foreign born	Native, one parent foreign born	Total
Atlantic islands	2,860	2,830	973	6,663
Austria	17,163	5,576	2,839	25,578
British:				
England	48,667	26,096	40,725	115,488
Ireland	52,475	69,988	37,216	159,679
Scotland	13,694	7,443	11,021	32,158
Wales	2,415	1,961	2,559	6,935
Australia	3,296	207	2,064	5,567
Canada—French	3,109	1,755	3,202	8,066
Canada—other	41,445	11,921	35,553	88,919
Total British	165,101	119,371	132,340	416,812
Denmark	14,208	8,244	4,043	26,495
Finland	6,156	2,535	301	8,992
France	17,390	8,836	6,387	32,613
Germany	76,305	85,362	44,715	206,382
Greece	7,918	269	211	8,398
Holland	2,304	1,078	1,035	4,417
Hungary	3,301	985	366	4,652
Italy	63,601	32,651	6,366	102,618
Mexico	33,444	10,787	6,806	51,037
Norway	9,952	4,666	2,528	17,146
Portugal	22,427	21,794	7,398	51,619
Russia	16,607	8,946	1,633	27,186
Spain	4,218	1,180	1,045	6,443
Sweden	26,210	14,797	5,464	46,471
Switzerland	14,520	8,861	4,632	28,018
Turkey	4,521	1,679	132	6,332
All other	9,044	†62,917	3,306	†75,267
Totals	517,250	403,364	232,525	1,153,139

*Foreign country in which born; or if native, in which parents were born.
†Exclusive of 161 whites and 5,107 Indians not distributed by state of birth.

NOTE.—The number of British born have increased in ten years from 123,725 to 416,812, an increase of 293,087.

COMPARATIVE SUMMARY.

Color, Nativity, and Parentage, 1890-1910.

Race	1890	1900	1910
White	1,111,833	1,402,727	2,259,672
Negro	11,322	11,045	21,645
Indian	16,624	15,377	16,371
Chinese	72,472	45,753	36,248
Japanese	1,147	10,151	41,356
All other*	----------	----------	2,257
Totals	1,213,398	1,485,053	2,377,549
Total native	847,089	1,117,813	1,791,117
Total foreign born	366,309	367,240	586,432
Total native white	818,280	1,086,222	1,742,422
Native parentage	497,890	644,428	1,106,533
Foreign parentage	217,979	282,830	403,364
Mixed parentage	102,411	158,964	232,525
Foreign-born white	293,553	316,505	517,250

*Includes 1,948 Hindus, 304 Koreans, and 5 Filipinos.

TABLE IX.

Japanese Farmers in 1912.

(Compiled from the Report of the Bureau of Labor Statistics.)

Counties	Owners		Total assessed value	Number of town lots	Total assessed value	Farm land leases	
	Number of farms	Acres				Number	Acreage*
Alameda	6	47	$63,200	36	$49,300	4	96
Alpine	--------	--------	--------	--------	--------	--------	--------
Amador	--------	--------	--------	--------	--------	--------	--------
Butte	--------	--------	--------	--------	--------	--------	--------
Calaveras	--------	--------	--------	--------	--------	--------	--------
Colusa	--------	--------	--------	--------	--------	--------	--------
Contra Costa	2	31	12,380	3	21,050	1	284
Del Norte	--------	--------	--------	--------	--------	--------	--------
El Dorado	--------	--------	--------	--------	--------	--------	--------
Fresno	31	4,776	229,020	61	75,695	11	45
Glenn	--------	--------	--------	3	1,750	--------	--------
Humboldt	--------	--------	--------	--------	--------	--------	--------
Imperial	--------	--------	--------	--------	--------	7	848
Inyo	--------	--------	--------	--------	--------	--------	--------
Kern	5	100	1,170	4	2,565	--------	--------
Kings	13	577	16,320	4	2,175	--------	--------
Lake	--------	--------	--------	--------	--------	--------	--------
Lassen	--------	--------	--------	--------	--------	--------	--------
Los Angeles	27	459	33,800	23	3,560	60	2,418
Madera	4	100	3,600	--------	--------	--------	--------
Marin	--------	--------	--------	--------	--------	--------	--------
Mariposa	--------	--------	--------	--------	--------	--------	--------
Mendocino	--------	--------	--------	--------	--------	--------	--------
Merced	14	1,049	42,095	2	1,785	--------	--------
Modoc	--------	--------	--------	--------	--------	--------	--------
Mono	--------	--------	--------	1	150	--------	--------
Monterey	2	8	1,280	18	1,050	15	1,741
Napa	1	160	2,300	--------	--------	1	--------
Nevada	1	320	820	1	1,200	--------	--------
Orange	5	41	4,190	--------	--------	7	292
Placer	26	732	20,335	4	1,825	23	1,007
Plumas	--------	--------	--------	--------	--------	--------	--------
Riverside	2	18	1,375	2	600	1	40
Sacramento	17	444	23,290	19	44,200	87	4,682
San Benito	3	60	2,050	--------	--------	5	280
San Bernardino	12	150	11,810	2	285	--------	--------
San Diego	--------	--------	--------	--------	--------	1	10
San Francisco	--------	--------	--------	5	5,470	--------	--------
San Joaquin	12	652	24,845	3	1,000	18	1,787
San Luis Obispo	--------	--------	--------	--------	--------	--------	--------
San Mateo	1	5	1,000	7	3,500	1	3
Santa Barbara	--------	--------	--------	--------	--------	7	327
Santa Clara	4	90	15,365	1	4,750	35	904
Santa Cruz	3	330	9,065	4	3,635	6	220
Shasta	1	82	555	--------	--------	--------	--------
Sierra	--------	--------	--------	1	300	--------	--------
Siskiyou	--------	--------	--------	--------	--------	--------	--------
Solano	11	814	23,230	2	550	5	565
Sonoma	2	66	5,900	3	3,600	1	--------
Stanislaus	2	40	1,625	--------	--------	1	180
Sutter	1	16	680	--------	--------	2	452
Tehama	--------	--------	--------	--------	--------	--------	--------
Trinity	--------	--------	--------	--------	--------	--------	--------
Tulare	15	1,053	47,525	2	2,150	2	60
Tuolumne	--------	--------	--------	--------	--------	--------	--------
Ventura	2	24	670	6	2,830	2	77
Yolo	5	320	8,830	--------	--------	11	1,278
Yuba	1	162	1,280	1	700	--------	--------
Totals	331	12,726	$609,605	218	$235,675	282	17,596

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*In 32 instances the acreage was not reported. Leases recorded from November 1, 1909, to December 1, 1912.

NOTE.—These figures show only the leases recorded in the offices of the various recorders, and do not represent all the land leased to Japanese, as most of the share leases are not recorded.

JAPANESE STATISTICS.

In March, 1912, the Japanese owned 331 farms, containing 12,726 acres, the assessed value of the land being $478,990, the improvements $130,615, or a total of $609,605.

The number of town lots held by Japanese was 218, the assessed value $136,955, and the improvements $98,720, or a total of $235,675.

The information gathered in accordance with an act of the legislature (chapter 134, of 1909) shows that there were 2,548 business establishments, the capital invested in most cases being very small, 68.7 per cent of the total having a capital of less than $1,000. The total aggregate capital invested, exclusive of that represented by banks, was $4,075,226. The total annual business transacted by these establishments amounted to $16,114,407, of which about 37 per cent was carried on with white persons. The total annual rent paid by these Japanese business houses was over $900,000.

Comparative Summary.

	1909	1912	
Owners:			
Acreage	10,791	12,726	+ 1,935
Total assessed value	$397,298	$609,605	+ $212,307
Number of town lots		218	
Total assessed value	$174,694	$235,675	+ $60,981
Leases:			
Number	319	282	
Acreage	20,294	17,596	

Color and Nativity. Of the total population of California, 1,106,533, or 46.5 per cent, are native whites of native parentage; 635,889, or 26.8 per cent, are native whites of foreign or mixed parentage, and 517,250, or 21.8 per cent, are foreign-born whites. The corresponding percentages in 1900 were 43.4, 29.7, and 21.3, respectively, the proportion of native whites of native parentage increasing somewhat during the decade. In 1910 Japanese constituted 1.7 per cent of the population; Chinese, 1.5; Negroes, 0.9; and Indians, 0.7. In 8 of the 58 counties the foreign-born whites represent as much as one-fourth of the population, the percentage being highest (32) in San Mateo. The proportion of native whites of foreign or mixed parentage exceeds one-fourth in 24 counties and is highest in San Francisco County (36.9 per cent).

Dwellings and Families. The total number of dwellings in California is 513,481, and the total number of families 563,636, there being 109.8 families to each 100 dwellings. The average number of persons per dwelling is 4.6, and the average number per family, 4.2.

TABLE X.

Color and Nativity of Farmers in 1910.

Counties	Native white	Foreign-born white	Negro and other non-white	Total number of farmers
Alameda	866	1,490	66	2,422
Alpine	24	16	2	42
Amador	387	145	5	537
Butte	1,204	274	22	1,500
Calaveras	420	207	5	632
Colusa	547	112	8	667
Contra Costa	712	715	38	1,465
Del Norte	62	46	6	114
El Dorado	551	150	15	716
Fresno	3,968	2,033	244	6,245
Glenn	502	160	1	663
Humboldt	856	614	64	1,534
Imperial	1,077	143	102	1,322
Inyo	313	98	27	438
Kern	818	298	51	1,167
Kings	1,312	475	50	1,837
Lake	478	122	3	603
Lassen	412	77	13	502
Los Angeles	5,682	1,613	624	7,919
Madera	419	131	23	573
Marin	138	360	------------	498
Mariposa	253	63	14	330
Mendocino	966	363	27	1,356
Merced	1,054	780	22	1,856
Modoc	639	80	17	736
Mono	44	42	5	91
Monterey	933	676	49	1,658
Napa	1,006	527	4	1,537
Nevada	349	184	11	544
Orange	2,362	718	85	3,165
Placer	619	263	180	1,062
Plumas	155	63	3	221
Riverside	2,044	517	127	2,688
Sacramento	885	485	231	1,601
San Benito	616	289	16	921
San Bernardino	2,365	567	17	2,949
San Diego	1,591	586	121	2,298
San Francisco	30	118	9	157
San Joaquin	2,179	977	130	3,286
San Luis Obispo	929	767	18	1,714
San Mateo	258	390	17	665
Santa Barbara	874	448	33	1,355
Santa Clara	2,725	1,860	146	4,731
Santa Cruz	851	588	27	1,466
Shasta	825	151	34	1,010
Sierra	77	32	1	110
Siskiyou	852	218	44	1,114
Solano	620	449	74	1,143
Sonoma	2,737	2,012	23	4,772
Stanislaus	1,879	801	7	2,687
Sutter	696	154	23	873
Tehama	799	188	19	1,006
Trinity	235	55	18	308
Tulare	3,253	707	61	4,021
Tuolumne	241	143	2	386
Ventura	965	307	21	1,293
Yolo	934	255	66	1,255
Yuba	338	91	7	436
Totals	58,926	26,193	3,078	88,197

PART III.

DOMESTIC ANIMALS.

Cattle, Horses, Mules, Asses, Swine, Sheep and Goats; Number and Value of Farm Animals 1875-1916; Imports and Exports of Farm Animals; Horses and Mules by Counties; Cattle, Sheep and Lambs by Counties; Production of Wool by Counties; Goats and Goats Hair; Summary of Domestic Animals by Counties; Poultry; Turkeys and Ducks; the Ostrich Industry; Dairy Products; Bees, Honey and Wax.

Cattle not being native to America, there are no strictly American breeds, but owing to difference in climate, care and ideals of American breeders, the European breeds which have been brought to America have changed to some extent.

Summary of All Domestic Animals and Their Value, 1910.*

Kind	On farms		Not on farms		Total	
	Number	Value	Number	Value	Number	Value
All cattle	2,077,025	$52,785,068	46,176	$1,604,717	2,123,201	$54,389,785
Dairy cows	467,332	18,597,328	29,962	1,321,897	497,294	19,919,225
Horses	468,886	47,099,196	132,521	15,142,841	601,407	62,242,037
Mules	69,761	9,016,444	10,612	1,638,381	80,373	10,654,825
Asses and burros	2,592	347,315	1,057	45,114	3,649	392,429
Swine	766,551	5,106,803	12,168	100,761	778,719	5,207,564
Sheep	2,417,477	8,348,997	64,631	232,572	2,482,108	8,581,569
Goats	138,413	320,829	7,113	32,629	145,526	353,458
Totals		$123,024,652		$18,797,015		$141,821,667

*Most of the domestic animals not on farms are found in cities, towns, and villages.

Neat Cattle.

Considerable attention has been given to breeding cows for dairy purposes only, and with this object in view large importations have been made of the Jerseys, Guernseys and Alderneys.

The Shorthorns, Herefords, and Polled Angus comprise practically all of the pure-blooded cattle in the United States used for breeding and for grading up native cattle for beef purposes. There are now also a number of Holstein-Friesians and Durhams.

Working Oxen.

In the early days oxen were largely employed in farming operations. In 1860 they numbered upward of 26,000, but the number declined rapidly during the next ten years, and after 1890 they dwindled away.

Asses and Burros.

In 1832, Henry Clay, who was a great advocate of the use of mules, brought the first pure-blooded Catalonian jack to Kentucky, and from then until the civil war quite a number of jacks were imported. With the revival of business after the war, there was a great demand for jacks, and they were imported from all the Mediterannean countries.

Until this time there had been but two breeds of asses generally recognized in this country, Maltese and Spanish. The importations into Tennessee and Kentucky have resulted in the production of a native type that is regarded by some breeders as better than any now imported.

There are also a large number of small donkeys, or burros, descendants of the small asses brought into Mexico and New Mexico at the early settlement of that section by the Spaniards, and are used principally by the Spanish and Mexican element. They are most useful in the mountainous sections.

Sheep.

In 1565, Spanish sheep were introduced into Florida, and those in that state today preserve traces of their Spanish origin. In 1773 they were introduced into California, and under the care of the Missions rapidly increased until, in 1825, it was estimated that seventeen of these Missions, extending from San Diego to San Francisco, held an aggregate of 1,003,970 sheep, exclusive of flocks owned by ranchers.

Sheep, of which at one time there were very large flocks, have fallen off since the year 1880, when they numbered 4,152,349; in 1910 there were 2,417,477, or a decrease of 1,734,872 since the former year.

The following statement shows at a glance the changes that have taken place in the number of domestic animals during the last sixty years:

Summary of the Number of Domestic Animals, 1850-1910.

Year	Horses and colts	Mules and colts	Cows and calves	Other cattle	Sheep and lambs	Swine
1850	21,719	1,666	4,280	258,379	17,574	2,776
1860	160,610	3,681	205,407	974,735	1,088,002	456,396
1870	192,273	17,533	164,093	467,305	2,768,187	444,617
1880	237,710	28,343	210,078	604,966	5,727,349	*868,419
1890	*455,073	*53,627	317,201	*1,291,217	3,373,036	*594,009
1900	421,293	96,190	307,245	*1,137,379	2,803,509	598,336
1910	468,886	69,761	467,332	1,609,693	2,417,477	766,551

Prior to 1890, asses and burros were included with mules.
*Including estimated number of range animals separately reported.

The principal breeds now are Southdown, Shropshire, Leicestershire, Cotswold, Oxford Down, Hampshire Down, Dorset Horns, Spanish and French Merino, and Persian.

Goats.

The Angora goat, a native of Asia Minor, was introduced into this country in 1849, and has been bred extensively in the United States. It crosses readily with the common goat, and the cross-breed frequently becomes the foundation of a good flock of fleece-bearing animals. The common goat has often been described as the poor man's cow. The Angora goat has been found to be of great service in clearing land of brush and low growths that sheep and cattle will not touch. The meat of the kids is said to be fully equal to the best young lamb, from which it is difficult to distinguish it. Angoras are among the most useful of domestic animals. Their fleeces, called the mohair, furnish material for the manufacture of some of the finest fabrics, their flesh is exceedingly delicate and nutritious, and their milk is richer than that of a cow.

The number of goats of all kinds in 1910 was 138,000, the lead being taken by Tehama County, with 28,000, and Shasta, with 18,000. Lake and Mendocino counties lead in Angora goats, having upward of 5,000 each.

Swine.

The swine introduced into the United States by the early colonists were of inferior stock. Between 1818 and 1830, the Chester White was evolved. The Berkshire was introduced from England about 1830, but did not come into general favor until 1870 to 1880. The Poland-China originated in Ohio between 1838 and 1840. Other breeds are Yorkshires and Hampshires. The interest in swine breeding in recent years is illustrated by the dates of first registration of the different swine breeders' associations, which were as follows: American Berkshire, 1875; Standard Poland-China, 1877; Central Poland-China, 1879; American Chester White, 1884; American Essex, 1887; American Duroc-Jersey and Standard White, 1890.

As a result of this interest, swine in this country have attained a high standard, with regard to form, bone, and line of maturity.

There are two distinct types of swine, the lard and the bacon types. Swine of the lard type far outnumber those of the bacon type in the United States. The lard type is preferred by the people of this country, consequently the majority of feeders produce the rapid fattening, heavily fleshed lard type.

The bacon type is not raised extensively in the United States. The production of choice bacon is more general in those countries where the feed of the hog is more varied and where corn is not relied upon as the principal grain for hogs.

The principal breeds of the lard type are the Poland-China, Berkshire, Chester White, Duroc-Jersey, and Hampshire.

The principal breeds of the bacon type are the Tamworth and the Large Yorkshire.

RECOGNIZED BREEDS AND PURE BRED ANIMALS IMPORTED.

(Under an act of congress, approved August 5, 1909, effective on and after November 11, 1913.)

Horses.

Name of breed	Book of record
Belgian Draft	Studbook des Chevaux de Trait Belges
Clydesdale	Clydesdale Studbook
French Draft	Studbook des Chevaux de Trait Francais
Hackney	Hackney Studbook
Percheron	Studbook Percheron de France
Shetland Pony	Shetland Pony Studbook
Shire	Shire Horse Society Studbook
Suffolk	Suffolk Studbook
Thoroughbred	*Australian Studbook
Thoroughbred	*Studbook Francais Registre des Chevaux de Pur Sang
Thoroughbred	General Studbook
Welsh Pony and Cob	Welsh Pony and Cob Studbook

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*Provided that no animal or animals registered in the Australian or in the French Thoroughbred studbooks shall be certified as pure bred unless such animal or animals trace in all crosses to animals which are proved to the satisfaction of the department to be of the thoroughbred breed.

Dogs.

Name of breed	Book of record
Belgian (Griffon Bruxellois, Schipperke, Chien de Berger Belges)	Livre des Orignes Saint-Hubert
Fifty-seven recognized breeds	Kennel Club Studbook
Foxhound	Foxhound Kennel Studbook
Greyhound	Greyhound Studbook
Harrier and Beagle	Harrier and Beagle Studbook
Swiss	Schweizerisches Hunde-Stammbuch
German Shepherd	Zuchtbuch fur Deutsche Schaferhunde

Provided that no dog or dogs registered in the above-mentioned books shall be certified as pure bred unless a three-generation certificate of pedigree issued by one of the above-mentioned societies is submitted for each dog.

Cats.

Name of breed	Book of record
Long haired and short haired	Register of the Governing Council of the Cat Fancy, 65-66 Chancery Lane, London, England

The recognized breeds of cattle, sheep and hogs are as follows:

Cattle.

Aberdeen-Angus
Alderney.
Ayrshire.
Devon.
Galloway.
Guernsey.
Hereford.
Highland.
Holstein-Friesian.
Jersey.
Kerry and Dexter.
Red Polled.
Shorthorn.
Sussex.
Welsh.

Sheep.

Cheviot.
Cotswold.
Dorset Horn.
Hampshire Down.
Kent or Romney Marsh.
Kerry Hill.
Leicester.
Leicester [Border].
Lincoln.
Shropshire.
Southdown.
Suffolk.
Wensleydale.
Oxford Down.

Hogs.

Berkshire.
Large Black.
Yorkshire.
Tamworth.

Recognized Breeds and Books of Record in Canada.

The Canadian National Records are recognized for the following breeds, provided that no animal or animals registered in the Canadian National Records shall be certified by the Secretary of Agriculture as pure bred unless such animal or animals trace, in all crosses, to animals which are proved to the satisfaction of the department to be of the same breed and to have been imported from the country in which the breed originated.

Horses.

Belgian Draft.
Clydesdale.
Hackney.
Percheron.
Shire.
Standard Bred.
Suffolk.
Thoroughbred.
Welsh Pony and Cob.

The Canadian National Records for dogs are recognized for all the breeds registered in said records; provided, that no dog or dogs registered in said records shall be certified as pure bred unless a three-generation certificate of pedigree, issued by the said Canadian National Records, is submitted for each dog.

CLASSIFIED SUMMARY OF DOMESTIC ANIMALS ON FARMS IN 1910.

Description	Number	Value	Average value
Cattle—			
Dairy cows (cows and heifers kept for milk, born before January 1, 1909)	467,332	$18,597,328	$39 79
Other cows (cows and heifers not kept for milk, born before January 1, 1909)	576,909	14,798,012	25 65
Heifers born in 1909	218,480	3,448,595	15 78
Calves born after January 1, 1910	267,799	1,883,523	7 03
Steers and bulls born in 1909	163,728	2,889,503	17 65
Steers and bulls born before January 1, 1909	321,984	9,941,169	30 87
Unclassified cattle	60,793	1,226,938	20 18
Totals	2,077,025	$52,785,068	*$25 41
Horses and colts—			
Mares, stallions and geldings born before January 1, 1909	402,584	$43,770,557	$108 72
Colts born in 1909	41,927	2,389,191	56 98
Colts born after January 1, 1910	23,037	767,648	33 32
Unclassified horses	1,338	171,800	128 40
Totals	468,886	$47,099,196	*$100 45
Mules and mule colts—			
Mules born before January 1, 1909	61,997	$8,552,021	$137 94
Mule colts born in 1909	4,913	351,667	71 58
Mule colts born after January 1, 1910	2,851	112,756	39 55
Totals	69,761	$9,016,444	*$129 25
Asses and burros (all ages)	2,592	$347,315	*$133 99
Swine—			
Hogs and pigs born before January 1, 1910	482,810	$4,346,824	$9 00
Pigs born after January 1, 1910	283,741	759,979	2 68
Totals	766,551	$5,106,803	*$6 66
Sheep and lambs—			
Ewes born before January 1, 1910	1,217,515	$4,914,783	$4 04
Rams and wethers born before January 1, 1910	307,773	1,326,699	4 31
Lambs born after January 1, 1910	892,189	2,107,515	*2 36
Totals	2,417,477	$8,348,997	*$3 45
Goats and kids (all ages)	138,413	$320,829	*$2 32
Grand total		$123,024,652	

*Average.

Sheep and Wool, Goats and Mohair in 1909-1910.

According to the Census Bureau, the total number of sheep of shearing age in California on April 15, 1910, was 1,525,000, representing a decrease of 11.6 per cent as compared with the number in 1900. The approximate production of wool during 1909 was 2,563,000 fleeces, weighing 14,065,000 pounds and valued at $2,424,000.

Although 1,714 farmers reported 138,413 goats and kids on their farms in 1910, only 367 reported the production of goat hair or mohair during 1909. These farmers reported 102,134 fleeces, weighing 282,596 pounds and valued at $60,821. The production shows a considerable increase between 1899 and 1909, but it is believed that the figures are somewhat short of the actual production.

WOOL*, 1913-1916.

The following estimates are taken from the annual report of the National Association of Wool Manufacturers, Boston:

	1913	1914	1915	1916
Number of fleeces	1,600,000	*1,852,000	1,900,000	1,850,000
Average weight of fleece, pounds	7	6.2	6.1	6.3
Per cent of shrinkage	67	65	64	64
Wool product, raw, pounds	11,200,000	11,480,000	11,590,000	11,600,000
Equivalent quantity of scoured wool, pounds	3,696,000	4,100,800	4,172,000	4,176,000
Average value per scoured pound October 1st	$0.45	$0.54	$0.65	$0.83
Total value October 1st	$1,663,200	$2,214,432	$2,711,800	$3,466,080

*Number of fleeces.

The comparative prices of California wool at Boston has been as follows on the scoured basis, per pound:

PRICES OF WOOL, 1905-1916.

Year	Cents		Year	Cents	
	Spring	Fall		Spring	Fall
1905	74	62	1911	48	40
1906	70	60	1912	54	45
1907	68	58	1913	48	40
1908	50	40	1914	53	45
1909	70	53	1915	65	55
1910	55	45	1916	80	57

CALIFORNIA WOOL PRODUCTION, 1905-1916.

(Commercial estimates. Duty—Free on and after December, 1913.)

Year	Pounds	Year	Pounds
1905	22,000,000	1911	12,000,000
1906	24,000,000	1912	11,900,000
1907	15,750,000	1913	11,200,000
1908	14,560,000	1914	11,480,000
1909	15,000,000	1915	11,590,000
1910	13,500,000	1916	11,600,000

*For the California wool production from 1854–1903, see Report for 1913, page 67. The imports of wool are given under so many classifications of camel, goat, alpaca, etc., unmanufactured and manufactured, that space will not allow the details to be given here.

MOHAIR.

Under the encouragement of a 15 per cent duty the production of this valuable fiber has probably increased, especially in Texas. The total production in the United States is estimated at 6,000,000 pounds, with an average value of 30 cents per pound at Boston. Texas, Oregon, New Mexico, California, and Arizona are the principal sources of supply of domestic mohair.

NUMBER AND VALUE OF FARM ANIMALS IN CALIFORNIA, 1876-1916; IMPORTS AND EXPORTS 1906-1916.

NOTE.—The imports and exports for animals is for the fiscal year ending June 30.

(Compiled from the reports of the United States Department of Agriculture.)

HORSES, 1876-1916.

Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31	Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31
1876	209,300	$45 46	$9,514,778	1897	439,364	$27 40	$12,037,918
1877	260,000	39 50	10,270,000	1898	417,396	28 96	12,085,909
1878	262,000	40 94	10,750,844	1899	342,265	27 54	9,426,483
1879	273,000	43 95	11,998,350	1900	321,729	38 61	12,422,429
1880	273,000	46 18	12,673,500	1901	363,982	49 66	18,074,805
1881	281,990	45 03	12,698,010	1902	353,063	56 28	19,869,542
1882	240,087	47 30	11,356,115	1903	370,716	60 66	22,485,881
1883	240,567	54 89	13,204,723	1904	367,000	65 66	24,099,139
1884	252,595	61 33	15,491,651	1905	363,339	67 48	24,518,741
1885	265,225	62 05	16,457,211	1906	399,673	76 32	30,505,037
1886	275,834	63 00	17,377,452	1907	391,680	92 00	36,120,721
1887	289,626	64 00	18,534,948	1908	396,000	94 00	37,224,000
1888	307,004	71 00	21,797,255	1909	412,000	90 00	37,080,000
1889	368,400	70 19	25,857,259	1910	483,000	105 00	49,245,000
1890	372,084	63 60	23,664,984	1911	493,000	117 00	57,681,000
1891	360,921	67 22	24,262,579	1912	503,000	109 00	54,827,000
1892	415,059	62 67	26,010,045	1913	498,000	100 00	49,800,000
1893	518,824	57 48	29,821,982	1914	503,000	100 00	50,300,000
1894	513,636	41 98	21,562,949	1915	493,000	96 00	47,328,000
1895	513,636	31 94	16,404,965	1916	468,000	97 00	45,396,000
1896	482,818	27 16	13,114,254				

Horses Imported, 1906-1916.

Year	For breeding purposes*		Other horses		Total horses	
	Number	Value	Number	Value	Number	Value
1906	3,377	$1,266,987	2,644	$449,688	6,021	$1,716,675
1907	3,644	1,574,020	2,436	404,085	6,080	1,978,105
1908	3,562	1,325,784	1,925	278,608	5,487	1,604,392
1909	4,953	1,658,640	2,131	348,636	7,084	2,007,276
1910	7,867	2,660,241	3,753	635,781	11,620	3,296,022
1911	6,331	2,055,418	3,662	636,656	9,593	2,692.074
1912	3,849	1,579,377	2,758	343,648	6,607	1,923,025
1913	5,713	1,653,713	4,295	472,162	10,008	2,125,875
1914	4,406	1,476,905	28,613	1,128,124	33,019	2,605,029
1915	1,849	473,138	10,803	504,242	12,652	977,380
1916	1,536	659,022	14,020	959,223	15,556	1,618,245

*Including teams of immigrants.

Horses Exported, 1906-1916.

Year	Number	Value	Year	Number	Value
1906	40,087	$4,365,981	1912	34,828	$4,764,815
1907	33,882	4,359,957	1913	28,707	3.960.102
1908	19,000	2,612.587	1914	22,776	3,388,819
1909	21,616	3,386,617	1915	289,340	64.046.534
1910	28,910	4,081,157	1916	357,553	73,531,146
1911	25,145	3,845,253			

Duty on Imported Horses.—For breeding purposes and pure bred and teams of immigrants, free. All others 10 per cent ad valorem on October 4, 1913, and after.

Certificated Horses Imported, 1914 and 1915.

The following table shows the number of certificated horses imported for breeding purposes during the calendar year ending December 31, 1914 and 1915, for which certificates of pure breeding have been issued by the Bureau of Animal Industry of the United States Department of Agriculture. In 1915 owing to the war the numbers show a large decrease, the total number imported during the calendar year 1915 amounting to only 306.

Breeds	1914			1915		
	Stallions	Mares	Total	Stallions	Mares	Total
Belgian draft	234	157	391	4	--------	4
Clydesdale	17	34	51	20	21	41
Hackney	4	20	24	4	19	23
Percheron	343	181	524	9	--------	9
Shetland pony	2	22	24	--------	--------	--------
Shire	54	14	68	30	14	44
Shetland pony	2	22	24	--------	--------	--------
Standard bred	--------	--------	--------	8	4	12
Suffolk	11	19	30	--------	1	1
Thoroughbred	37	13	50	86	86	172
Welsh pony	11	49	60	1	--------	1
Totals	715	511	1,226	162	145	306

NOTE.—For full details regarding the number and different breeds of stallions in the state, see the Report of the California Stallion Registration Board. For further information relating to Working Oxen, Sheep and Goats, see the Statistical Report of the State Board of Agriculture for 1913.

MULES, 1876-1916.

Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31	Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31
1876	19,400	$77 20	$1,497,680	1897	57,473	$36 89	$2,120,329
1877	26,500	67 75	1,795,375	1898	56,898	38 33	2,180,836
1878	25,000	68 98	1,752,092	1899	52,915	34 15	1,807,174
1879	25,700	66 24	1,702,368	1900	48,682	48 49	2,300,713
1880	25,700	67 54	1,735,778	1901	77,452	60 44	4,681,555
1881	25,700	68 79	1,767,903	1902	72,030	69 23	4,986,745
1882	28,910	69 20	2,000,572	1903	67,708	72 02	4,876,600
1883	30,066	70 98	2,134,085	1904	67,031	72 68	4,871,487
1884	29,765	80 18	2,386,558	1905	66,361	76 39	5,069,044
1885	31,551	84 30	2,659,749	1906	69,679	91 30	6,361,689
1886	31,551	77 65	2,450,081	1907	80,750	106 00	8,599,875
1887	36,284	83 67	3,035,912	1908	82,000	113 00	9,266,000
1888	38,824	85 03	3,301,389	1909	83,000	107 00	8,881,000
1889	40,765	83 78	3,415,201	1910	71,000	122 00	8,540,000
1890	42,803	78 21	3,347,496	1911	72,000	136 00	9,792,000
1891	43,659	79 41	3,467,093	1912	73,000	130 00	9,490,000
1892	54,574	74 72	4,077,548	1913	73,000	120 00	8,760,000
1893	60,031	67 90	4,076,130	1914	74,000	120 00	8,880,000
1894	63,033	56 38	3,553,899	1915	70,000	110 00	7,700,000
1895	63,033	46 25	2,915,041	1916	70,000	116 00	8,120,000
1896	59,251	35 02	2,074,789				

Mules Imported.

(Included in "All Other" Animals.)

Mules Exported, 1906 -1916.

Year	Number	Value	Year	Number	Value
1906	7,167	$989,639	1912	4,901	$732,095
1907	6,781	850,901	1913	4,744	733,795
1908	6,609	990,667	1914	4,883	690,974
1909	3,432	472,017	1915	65,788	12,726,143
1910	4,512	614,094	1916	111,915	22,960,312
1911	6,585	1,070,051			

Duty on Imported Mules.—Teams of immigrants, free. All others, 10 per cent ad valorem on October 4, 1913, and after.

MILCH COWS, 1876-1916.

Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31	Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31
1876	363,800	$31 46	$11,445,148	1897	339,002	$25 57	$8,668,281
1877	381,900	30 64	11,701,416	1898	342,392	28 65	9,809,531
1878	389,500	28 23	10,955,585	1899	318,425	28 00	8,915,900
1879	459,600	25 90	11,903,640	1900	308,872	33 75	10,424,430
1880	473,400	28 65	13,562,910	1901	321,227	37 10	11,917,522
1881	473,400	31 67	14,992,578	1902	327,652	40 05	13,122,463
1882	214,280	32 70	7,006,956	1903	337,482	40 43	13,664,397
1883	214,280	36 17	7,750,508	1904	344,232	38 55	13,270,144
1884	220,708	38 00	8,386,904	1905	354,559	36 57	12,966,223
1885	231,743	38 50	8,922,106	1906	390,015	34 65	13,514,020
1886	236,378	38 75	9,159,648	1907	405,616	35 00	14,196,560
1887	243,469	33 22	8,088,040	1908	410,000	36 00	14,760,000
1888	250,773	33 00	8,275,509	1909	430,000	36 00	15,480,000
1889	258,296	31 38	8,105,328	1910	495,000	38 40	17,933,000
1890	268,628	27 75	7,454,427	1911	505,000	53 00	26,765,000
1891	282,059	29 00	8,179,711	1912	510,000	53 50	27,285,000
1892	290,521	26 95	7,829,541	1913	515,000	62 00	31,930,000
1893	299,237	27 25	8,154,208	1914	541,000	72 00	38,952,000
1894	329,161	25 82	8,498,937	1915	568,000	69 00	39,192,000
1895	339,036	23 78	8,062,276	1916	591,000	67 00	39,597,000
1896	335,646	23 75	7,971,593				

OTHER CATTLE, 1876-1916.

Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31	Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31
1876	1,075,000	$20 08	$21,586,000	1897	853,279	$16 93	$14.448 828
1877	1,053,500	16 52	17,403,820	1898	810,615	18 91	15,328,331
1878	1.600,800	17 23	17,243,784	1899	664,704	18 01	11,970,981
1879	1,010,000	18 91	19,099,100	1900	604,881	24 57	14,864,947
1880	999,900	18 47	18,468,153	1901	1,048,046	22 25	23,315,670
1881	999,900	20 35	20,347,965	1902	1,089,968	23 48	25,593,770
1882	422,433	21 77	9,196,366	1903	1,111,767	24 51	27,244,079
1882	575,000	27 48	15,801,000	1904	1,089,532	21 98	23,944,214
1884	609,500	29 15	17,766,925	1905	1,122,218	19 29	21,648,258
1885	615,595	30 38	18.701,776	1906	1,167,107	17 52	20,453,549
1886	627,907	28 66	17,994 559	1907	1,167,107	18 00	21,474,767
1887	659,302	20 64	13,607,595	1908	1,155,000	19 00	21,945,000
1888	692,267	20 50	14,194,447	1909	1,155,000	17 50	20.212,000
1889	726,880	19 37	14,080,181	1910	1,546,000	20 10	32,361,000
1890	697,805	16 80	11.719,707	1911	1,515,000	26 70	40,450,000
1891	558,244	17 73	9,895,321	1912	1,454,000	29 20	42,457,000
1892	602.904	17 39	10,481,663	1913	1,410,000	33 00	46,530,000
1893	916,414	17 12	15,690.840	1914	1,480,000	39 30	58,164,000
1894	925,578	16 17	14,962,157	1915	1,558,000	36 30	56,555,000
1895	916,322	15 28	14,003,785	1916	1,636,000	38 10	62,332,000
1896	888,832	15 82	14,057,319				

Cattle Imported, 1906-1916.

Year	For breeding purposes*		Other cattle		Total cattle	
	Number	Value	Number	Value	Number	Value
1906	829	$118,368	28,190	$430,062	29,019	$548,430
1907	835	122,230	31,567	442,892	32,402	565,122
1908	3,188	149,142	89,168	1,358,168	92,356	1,507,310
1909	3,049	140,713	136,135	1,858,709	139,184	1,999,422
1910	2,611	291,139	193,327	2,708,685	195,138	2,999,824
1911	2,441	362,220	180,482	2,590,857	182,923	2,953,077
1912	2,129	305,222	316,243	4,500,352	318,372	4,805,574
1913	1,388	234,489	420,261	6,406,179	421,649	6,640,668
1914	718,352	16,328,819	150,016	2,367,899	868,368	18,696,718
1915	538,167	17,513,175	----------	----------	538,167	17,513,175
1916	439,185	15,187,593	----------	----------	439,185	15,187,593

*Including teams of immigrants.

Cattle Exported, 1906-1916.

Year	Number	Value	Year	Number	Value
1906	584,239	$42,081,170	1912	105,506	8,870,075
1907	423,051	34,577,392	1913	24,714	1,177,199
1908	349,210	29,339,134	1914	18,376	647,288
1909	207,542	18,046,976	1915	5,484	702,847
1910	139,430	12,200,154	1916	21,287	2,378,248
1911	150,100	$13,163,920			

Duty on Imported Cattle.—Free October 4, 1913, and after.

SHEEP, 1876-1916.

Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31	Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31
1876	6,750,000	$2 02	$13,635,000	1897	2,577,050	$1 86	$4,800,787
1877	7,290,000	1 40	10,206,000	1898	2,589,935	2 23	5,785,915
1878	6,561,000	1 52	9,972,720	1899	2,175,545	2 64	5,742,352
1879	6,889,000	1 61	11,091,290	1900	2,001,501	2 85	5,710,282
1880	7,646,800	1 62	12,387,816	1901	2,342,923	3 00	7,033,221
1881	7,493,864	1 70	12,739,569	1902	2,319,494	2 90	6,729,085
1882	6,352,344	1 65	10,481,368	1903	2,365,884	2 92	6,915,716
1883	5,907,680	2 02	11,933,514	1904	2,271,249	2 75	6,237,758
1884	6,203,064	1 90	11,785,822	1905	2,180,399	2 67	5,824,718
1885	5,892,911	1 89	11,137,602	1906	2,398,439	3 03	7,273,266
1886	6,069,698	1 81	10,961,268	1907	2,422,423	3 30	8,006,107
1887	6,069,698	1 77	10,728,192	1908	2,422,000	3 47	8,404,000
1888	5,462,728	1 88	10,291,779	1909	2,325,000	2 80	6,510,000
1889	3,956,000	1 88	7,453,104	1910	2,683,000	3 30	9,694,000
1890	4,035,120	2 08	8,409,190	1911	2,656,000	3 60	9,562,000
1891	3,712,310	2 20	8,157,801	1912	2,603,000	3 70	9,631,000
1892	4,083,541	2 42	9,884,211	1913	2,551,000	3 80	9,694,000
1893	4,124,376	2 32	9,559,479	1914	2,500,000	4 50	11,250,000
1894	3,918,157	1 81	7,074,625	1915	2,450,000	5 00	12,250,000
1895	3,526,341	1 65	5,817,052	1916	2,524,000	6 70	16,911,000
1896	2,962,126	1 85	5,483,784				

Sheep Imported, 1906-1916.

Year	For breeding purposes		Other sheep		Total sheep	
	Number	Value	Number	Value	Number	Value
1906	2,679	$53,951	238,068	$966,408	240,747	$1,020,359
1907	3,081	67,555	221,717	1,052,870	224,798	1,120,425
1908	5,609	104,509	219,156	978,097	224,765	1,082,606
1909	4,860	89,272	97,803	413,368	102,663	502,640
1910	6,335	135,019	119,817	561,860	126,152	696,879
1911	5,341	116,277	48,114	261,348	53,455	377,625
1912	2,208	29,106	21,380	128,151	23,588	157,257
1913	388	8,903	15,040	81,118	15,428	90,021
1914	221,836	516,912	1,883	15,492	532,404	223,719
1915	153,317	533,967			153,317	533,967
1916	235,659	917,502			235,659	917,502

Export of Domestic Sheep, 1906-1916.

Year	Number	Value	Year	Number	Value
1906	142,690	$804,090	1912	157,263	$626,985
1907	135,344	750,242	1913	187,132	605,725
1908	101,000	589,285	1914	152,600	534,543
1909	67,656	365,155	1915	47,213	182,278
1910	44,517	209,000	1916	52,278	231,535
1911	121,491	636,272			

Duty on Imported Sheep.—Free October 4, 1913, and after.

SWINE, 1876-1916.

Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31	Year	Number, Dec. 31	Average farm price, Dec. 31	Farm value, Dec. 31
1876	363,300	$7 17	$2,604,861	1897	487,163	$4 13	$2,013,738
1877	417,700	6 20	2,589,740	1898	467,676	4 08	1,906,247
1878	438,500	6 27	2,749,395	1899	374,141	4 47	1,673,907
1879	565,000	5 95	3,361,750	1900	329,244	6 26	2,061,068
1880	661,000	3 97	2,624,170	1901	521,906	6 61	3,449,172
1881	667,600	4 98	3,324,648	1902	506,249	6 79	3,439,457
1882	585,443	6 20	3,629,747	1903	511,311	7 63	3,901,303
1883	856,000	7 14	6,111,840	1904	526,650	6 55	3,449,558
1884	950,160	5 66	5,377,906	1905	521,384	6 10	3,180,442
1885	978,665	5 80	5,676,257	1906	573,522	5 45	3,125,695
1886	1,027,598	4 15	4,266,586	1907	550,581	7 10	3,909,125
1887	1,017,322	3 78	3,841,409	1908	551,000	7 20	3,967,000
1888	1,047,842	4 62	4,836,000	1909	562,000	6 50	3,653,000
1889	647,000	5 59	3,616.213	1910	790,000	8 20	6,289,000
1890	647,000	4 91	3,175,476	1911	830,000	8 30	6,289,000
1891	517,600	5 26	2,723,611	1912	822,000	9 20	7,562,000
1892	512,424	5 35	2,741,675	1913	797,000	10 50	8,368,000
1893	399,691	6 12	2,446,110	1914	877,000	10 50	9,208,000
1894	435,663	5 57	2,427,342	1915	947,000	8 40	7,955,000
1895	487,943	5 54	2,702,812	1916	994,000	10 10	10,039,000
1896	507,461	4 03	2,045 677				

Swine Exported,* 1906-1916.

Year	Number	Value	Year	Number	Value
1906	59,170	$630,998	1912	19,038	159,370
1907	24,262	309,440	1913	15,332	151,747
1908	30,818	307,202	1914	10,122	133,751
1909	18,655	144,605	1915	7,779	93,067
1910	4,410	46,955	1916	22,048	238,718
1911	8,551	$74,032			

Duty on Imported Swine.—Free October 4, 1913, and after.

*Swine imported are not given separately, but included under "All Other" animals.

TABLE XI.

Horses, Mules and Colts, by Counties, 1910.

Counties	Mature horses	Yearling colts	Spring colts	Total	Mature mules	Yearling colts	Spring colts	Total
Alameda	9,266	842	536	10,644	223	4	--------	227
Alpine	376	38	12	426	18	--------	--------	18
Amador	2,291	218	176	2,685	212	10	17	239
Butte	6,608	645	402	7,655	1,719	151	91	1,961
Calaveras	3,143	302	203	3,648	25	13	25	63
Colusa	3,992	481	259	4,732	4,607	437	247	5,291
Contra Costa	9,494	1,095	644	11,233	564	63	24	651
Del Norte	382	45	14	441	3	--------	--------	3
El Dorado	2,274	180	90	2,544	93	9	10	112
Fresno	22,063	1,899	1,047	25,009	3,498	298	183	3,979
Glenn	3,319	339	262	3,946	3,033	207	122	3,362
Humboldt	5,851	421	131	6,403	189	--------	--------	189
Imperial	6,277	580	372	7,229	1,583	69	20	1,672
Inyo	4,074	555	403	5,032	249	55	33	337
Kern	8,670	987	530	10,347	1,099	103	46	1,248
Kings	9,417	1,174	882	11,473	855	142	72	1,069
Lake	2,172	216	104	2,492	182	45	36	263
Lassen	7,548	1,406	561	9,515	414	185	103	702
Los Angeles	20,375	1,376	673	22,424	2.459	76	35	2,570
Madera	3.498	334	238	4,070	2,928	154	59	3,141
Marin	2,338	166	54	2,558	11	--------	--------	11
Mariposa	1,896	218	126	2,240	201	46	49	296
Mendocino	5,300	510	184	5,994	298	10	1	309
Merced	10,308	1,453	795	12,556	3,673	198	204	4,075
Modoc	12,247	2,212	976	*15,636	565	441	126	1,132
Mono	1,655	310	132	2,097	73	46	17	136
Monterey	14,172	1,993	1,268	*17,444	546	66	30	642
Napa	5,145	528	237	5,910	345	18	9	372
Nevada	1,830	124	70	*2,074	57	11	--------	68
Orange	9,580	760	225	10,565	2,223	38	7	2,268
Placer	3,762	294	137	4.193	459	13	26	498
Plumas	1,770	206	68	*2,044	41	2	--------	43
Riverside	8,969	943	403	10,315	1,303	83	43	1,429
Sacramento	8,770	773	426	9.969	703	30	10	743
San Benito	6,921	955	599	8,475	74	19	3	96
San Bernardino	6,339	372	167	6,878	757	18	3	778
San Diego	9,663	1,130	705	11,498	683	60	23	766
San Francisco	318	--------	1	319	--------	--------	--------	--------
San Joaquin	18,256	1,597	1,089	*20,972	3,169	217	144	3,530
San Luis Obispo	12,601	1,686	987	15,274	754	83	40	877
San Mateo	3.940	253	102	4,295	10	2	--------	12
Santa Barbara	10,621	1,442	971	13,034	362	56	25	443
Santa Clara	14,405	899	512	15,816	267	7	--------	274
Santa Cruz	3.914	260	116	4,290	84	4	--------	88
Shasta	4,516	488	213	5,217	224	57	13	294
Sierra	1,199	155	40	1,394	20	--------	--------	20
Siskiyou	7,690	1,037	423	9,150	390	76	37	503
Solano	6,993	695	362	8,050	2,157	84	78	2,319
Sonoma	12,611	733	384	13,728	388	8	2	398
Stanislaus	11,818	1,120	619	*14,357	5,032	236	174	5,442
Sutter	4,869	587	228	5,684	1,922	107	67	2.096
Tehama	5,073	525	278	5.876	1,409	163	103	1,675
Trinity	1.150	117	39	1,306	142	19	7	168
Tulare	18.917	2,003	1,250	*22,200	3,149	288	218	3,655
Tuolumne	2,053	242	196	2,491	76	7	8	91
Ventura	9,955	906	589	*11,480	2,250	66	46	2.362
Yolo	7,127	814	374	8,315	3.501	265	189	3,955
Yuba	2,803	288	153	3,244	726	48	26	800
Totals	402,584	41,927	23,037	*468,886	61,997	4,913	2,851	69,761

*Includes animals, age or sex not specified.

TABLE XII.

Cattle by Counties in 1910.

Counties	Dairy cows	Other cows	Yearling heifers	Calves	Yearling steers and bulls	Other steers and bulls	Total
Alameda	9,172	5,827	2,609	4,113	1,107	1,491	*24,319
Alpine	759	661	485	426	400	23	2,754
Amador	2,747	7,985	2,175	3,444	1,970	3,945	22,266
Butte	4,713	8,359	2,605	3,772	2,109	4,660	*26,584
Calaveras	1,824	8,407	2,432	3,355	2,057	2,902	20,977
Colusa	3,128	6,571	2,140	2,606	1,556	2,619	*18,750
Contra Costa	9,469	6,567	3,240	4,479	1,123	1,651	26,529
Del Norte	3,575	620	849	1,306	273	234	6,857
El Dorado	2,823	4,338	1,683	2,154	1,138	912	13,048
Fresno	22,241	42,001	13,117	12,682	15,354	22,230	127,625
Glenn	3,688	3,601	1,410	2,409	1,925	2,051	*16,214
Humboldt	21,572	7,837	5,531	8,334	3,413	6,590	*53,775
Imperial	9,653	2,728	2,560	2,772	1,379	1,817	*22,741
Inyo	2.267	8,970	2,583	2,255	2,445	1,788	20,308
Kern	6,917	38,101	8,441	7,372	6,459	24,271	*118,320
Kings	18,593	21,655	7,281	8,793	3,745	14,908	74,975
Lake	1,487	2,113	821	1,133	574	1,286	7,414
Lassen	2,890	18,444	5,975	4,906	5,456	6,161	43,832
Los Angeles	20,524	8,027	5,561	5,211	1,666	1,106	43,095
Madera	1,592	12,406	2,425	2,975	2,252	3,946	*27,905
Marin	24,803	3,564	2,880	6,509	567	641	*39,266
Mariposa	905	7,477	1,602	2,115	1,683	2,876	*16,671
Mendocino	6,454	9,280	3,054	3,980	2,503	4,883	30,154
Merced	19,678	43,250	14,858	14,625	11,036	34,767	*150,467
Modoc	2,903	18,502	6,937	4,608	6,517	7,449	46,916
Mono	450	2,270	803	666	685	427	5,301
Monterey	14,066	27,626	11,046	13,806	7,502	13,133	*88,889
Napa	6,270	3,945	1,403	2,518	758	937	*15,866
Nevada	2,395	2,950	832	1,069	495	865	8,606
Orange	6,184	4,473	2,124	2,231	1,168	2,040	18,220
Placer	2,421	2,283	602	1,204	428	532	*7,510
Plumas	3,437	1,954	1,561	1.586	1,468	1,395	11,401
Riverside	5,235	4,449	2,493	2,203	1,333	3,755	19,468
Sacramento	11,979	5.484	3,195	5,568	1,529	1,961	*31,188
San Benito	4,828	11,064	4,459	5,864	4,151	8,987	*39,703
San Bernardino	3,043	4,389	1,075	926	481	2,847	12,761
San Diego	10,633	15,815	7,874	8,088	6,490	9,877	58,777
San Francisco	1,645	10	581	174	75	25	2,510
San Joaquin	11,904	6,861	3,636	4,960	1,937	1,998	31,296
San Luis Obispo	24,193	22,903	10,345	15,635	8,948	33,180	*118,704
San Mateo	8,119	2,305	1,848	2,375	369	272	15,288
Santa Barbara	11,690	23,752	6,891	11,524	8,666	24,578	*87,576
Santa Clara	12,181	12,251	4,449	5,443	3,133	7,552	*46,030
Santa Cruz	4,210	1,811	1,113	1,779	438	749	10,100
Shasta	2,923	15,433	3,678	3,308	3,197	5,580	34,119
Sierra	1,563	2,268	850	874	831	1,401	7,787
Siskiyou	7,018	14,781	5,965	4,919	5,359	6,513	*45,079
Solano	9,279	4,257	1,933	3,720	1,187	1,408	21,784
Sonoma	24,961	5,835	4,804	9,517	1,805	1,705	*48,727
Stanislaus	20,678	9,047	5,294	7,252	2,922	3,765	*49,132
Sutter	6,728	3,254	1,939	2,623	1,012	823	*16,604
Tehama	3,462	10,691	2,646	3,520	2,590	2,400	25,309
Trinity	804	5,143	1,415	1,126	1,308	2,089	11,885
Tulare	26,765	29,478	11,911	16,092	8,784	10,429	*104,484
Tuolumne	1,773	8,415	2,040	2,977	1,531	1,223	*18,659
Ventura	2,666	5,887	2,139	2,442	2,095	10,850	*29,929
Yolo	7,197	3,761	2,654	2,649	1,194	1,522	18,977
Yuba	2,255	4,773	1,628	1,827	1,152	1,959	13,594
Totals	467,332	576,909	218,480	267,799	163,728	321,984	2,077,025

*Includes animals, age or sex not specified.

TABLE XIII.

Sheep, Lambs, and Swine, by Counties, 1910.

Counties	Rams, ewes and wethers	Spring lambs	Total	Mature hogs	Spring pigs	Total
Alameda	5,680	3,507	9,187	3,640	2,770	6,410
Alpine	9.832	6,808	16,640	309	208	517
Amador	3,919	2,726	6,645	3,623	1,673	5,296
Butte	29,137	15,940	45,077	9,317	5,016	14,333
Calaveras	10,145	5,215	15,360	2,588	1,586	4,174
Colusa	39,801	24,791	64,592	17,646	10,418	28,064
Contra Costa	14,132	5,463	19,595	3,887	3,054	6,941
Del Norte	1,341	500	1,841	1,153	617	1,770
El Dorado	1,763	1,399	3,162	1,428	973	2,401
Fresno	94,757	47,254	142,011	20,134	13,016	33,150
Glenn	70,210	41,153	111,363	12,483	5,827	18,310
Humboldt	62,423	24,650	87,073	7,688	4,945	12,633
Imperial	13,786	9,553	23,339	45,764	24,798	70,562
Inyo	17,240	26,106	43,346	1,795	1,560	3,355
Kern	19,801	10,516	30,317	13,376	7,137	20,513
Kings	40,483	21,891	62,374	22,775	17,858	40,633
Lake	7,436	3,511	10,947	5,301	2,737	8,038
Lassen	42.490	30,225	72,725	3,079	1,955	5,034
Los Angeles	22,261	8,830	31,091	18,418	10,524	28,942
Madera	6,269	3,837	10,106	4,444	2,409	6,853
Marin	1,930	1,025	2,955	8,812	7,287	16,099
Mariposa	877	304	1,181	6,160	2,722	8,882
Mendocino	88,760	41,010	129,770	14,600	7,469	22,069
Merced	28,044	11,724	39,768	19,414	10,121	29,535
Modoc	46,078	30,484	76,562	5,328	3,160	8,488
Mono	40,805	22,241	63,046	179	244	423
Monterey	17,029	11,845	28,874	12,567	7,464	20,031
Napa	5,794	5,084	10,878	5,160	3,184	8,344
Nevada	6,853	4,309	11,162	1,067	749	1,816
Orange	31,802	11,876	43,678	2,265	2,183	4,448
Placer	15,142	9,326	24,468	1,822	1,565	3,387
Plumas	845	314	1,159	665	744	1,409
Riverside	5,589	1,420	7,009	3,892	2,258	6,150
Sacramento	25,828	21,129	46,957	6,421	4,034	10,455
San Benito	10,635	4,511	15,146	5,572	2,560	8,132
San Bernardino	7	----------	7	2,562	1,187	3,749
San Diego	220	69	289	4,261	3,130	7,391
San Francisco	3	----------	3	181	100	281
San Joaquin	14,807	10,012	24,819	13,473	9,981	23,454
San Luis Obispo	54,717	32,236	86,953	11,750	6,118	17,868
San Mateo	767	562	1,329	8,692	3,990	12,682
Santa Barbara	60,205	20,328	80,533	15,113	6,960	22,073
Santa Clara	4,449	5,606	10,055	4,165	3,184	7.349
Santa Cruz	876	703	1,579	2,165	1,509	3,674
Shasta	11,449	5,574	17,023	12,832	5,968	18,800
Sierra	3,005	93	3,098	370	294	664
Siskiyou	18,013	11,909	29,922	6,116	3,396	9,512
Solano	96,921	73,232	170,153	8,836	4,732	13,568
Sonoma	44,095	21,220	65.315	10,995	7,428	18,423
Stanislaus	15,874	7,378	23,252	13,610	9,417	23,027
Sutter	51,135	38,530	89,665	9,121	6,008	15,129
Tehama	185,023	112,713	297,736	10,915	4,025	14,940
Trinity	2,732	1,081	3,813	2,594	1,457	4,051
Tulare	14,014	7,170	21,184	23,942	14,250	38,192
Tuolumne	1,795	671	2,466	2,590	1,303	3,893
Ventura	16,113	15,658	31,771	6,984	3,514	10,498
Yolo	49,807	29,639	79,446	15,483	8,714	24,197
Yuba	40,344	27,318	67,662	3,288	2,251	5,539
Totals	1,525,288	892,189	2,417,477	482,810	283,741	766,551

TABLE XIV.

Wool Produced by Counties, 1860-1900.

(Compiled from Reports of the Census Bureau.)
(Pounds.)

Counties	1860	1870	1890	1880	1900
Alameda	284,735	138,975	205,955	156,065	148,810
Alpine	---	281,700	90	2,015	6,480
Amador	20,650	73,010	64,808	53,879	30,385
Butte	92,400	351,023	323,483	307,739	551,590
Calaveras	10,335	129,025	161,351	130,761	120,090
Colusa	66,900	1,086,599	661,782	603,822	113,040
Contra Costa	74,108	58,800	27,293	92,415	20,900
Del Norte	---	3,471	6,462	7,524	3,520
El Dorado	1,130	50,096	73,233	2,251	980
Fresno	---	191,594	1,477,000	1,802,043	425,862
Glenn	---	---	---	---	328,020
Humboldt	---	51,867	647,492	997,649	948,970
Imperial	---	---	---	---	---
Inyo	---	---	35,382	139,252	264,290
Kern	---	281,100	666,427	1,163,056	792,700
Kings	---	72	---	---	678,630
Lake	---	58,046	185,418	139,584	41,940
Lassen	---	75	92,748	152,232	269,180
Los Angeles	209,869	962,603	1,499,895	544,660	244,380
Madera	---	---	---	---	279,810
Marin	17,820	6,692	2,080	153	2,947
Mariposa	---	87,816	163,896	225,895	15,290
Mendocino	18,794	178,493	990,264	1,048,020	1,089,490
Merced	28,500	231,072	631,725	984,505	712,310
Modoc	---	---	71,378	86,499	310,725
Mono	---	7,000	350	15,888	176,520
Monterey	485,167	1,054,310	523,612	267,247	56,100
Napa	31,390	20,789	157,085	156,368	17,810
Nevada	---	---	8,002	6,816	15,750
Orange	---	---	---	1,110,112	293,620
Placer	31,330	169,033	233,901	439,723	145,810
Plumas	---	13,023	23,608	5,833	27,290
Riverside	---	---	---	---	76,650
Sacramento	67,005	515,213	509,834	254,263	227,900
San Benito	---	---	323,285	128,247	59,740
San Bernardino	4,000	71,075	250,338	176,100	38,574
San Diego	5,150	9,250	811,308	130,180	91,040
San Francisco	---	---	---	---	---
San Joaquin	36,477	86,700	466,960	111,585	176,160
San Luis Obispo	260,100	903,863	643,853	146,740	77,800
San Mateo	7,535	12,625	2,819	4,040	4,510
Santa Barbara	150,200	996,200	692,415	71,600	509,250
Santa Clara	19,000	179,465	73,024	1,103	15,920
Santa Cruz	24,875	3,100	3,640	3,760	4,410
Shasta	---	15,820	88,142	68,164	126,900
Sierra	---	---	3,625	---	8,310
Siskiyou	1,150	43,858	135,164	62,024	85,920
Solano	240,937	306,817	290,996	208,385	412,140
Sonoma	78,223	230,394	664,721	547,120	335,010
Stanislaus	38,249	749,263	787,516	176,807	216,990
Sutter	83,062	126,657	152,367	181,489	305,150
Tehama	32,675	445,456	484,763	1,408,818	1,648,750
Trinity	---	---	80,115	64,189	62,290
Tulare	16,900	660,645	460,080	1,112,091	355,142
Tuolumne	150	48,525	58,535	39,170	9,930
Ventura	---	---	728,932	281,504	10,000
Yolo	146,806	437,048	276,721	280,977	456,870
Yuba	97,487	63,425	194,163	258,155	232,960
Totals	2,683,109	11,391,743	*16,798,036	†16,358,547	13,680,495

*Exclusive of wool obtained from range sheep.

†In a summary issued in 1900, the total wool produced is stated at 24,092,954 pounds.

TABLE XV.

Goats, Wool, Mohair, and Goat Hair, 1900-1910.

(Compiled from the Reports of the Census Bureau.)

Counties	Number of goats, 1900	Number of goats, 1910	Number of wool fleeces shorn, 1910	Mohair and goat hair fleeces shorn, 1910	Value of wool and mohair produced, 1910
Alameda	66	64	5,783	-----	$4,930
Alpine	-----	10	6,790	-----	9,561
Amador	1,584	1,597	7,253	449	5,882
Butte	1,562	3,215	38,261	1,749	33,991
Calaveras	1,142	3,348	15,677	517	11,551
Colusa	4,289	2,154	73,221	4,009	56,620
Contra Costa	79	17	14,715	-----	10,869
Del Norte	-----	465	1,238	40	2,070
El Dorado	591	3,315	3,808	933	3,504
Fresno	517	4,558	107,802	1,900	109,982
Glenn	4,571	2,813	131,612	5,177	101,749
Humboldt	920	3,747	85,212	2,540	104,430
Imperial	-----	147	12,755	26	17,067
Inyo	8,382	2,846	17,847	505	27,761
Kern	3,364	930	24,177	355	26,540
Kings	870	507	73,393	26	58,836
Lake	10,512	9,018	10,372	6,603	12,922
Lassen	45	586	36,768	2,088	55,154
Los Angeles	13,580	8,238	31,754	230	32,366
Madera	83	278	4,905	60	2,272
Marin	25	147	2,823	-----	2,816
Mariposa	1,026	931	355	154	376
Mendocino	3,627	3,927	149,260	2,315	158,918
Merced	1,878	5,246	46,908	8,400	39,400
Modoc	1,280	549	39,538	1,356	55,583
Mono	651	25	29,160	-----	41,209
Monterey	3,127	3,983	24,884	3,000	26,549
Napa	632	556	9,955	153	7,196
Nevada	989	2,198	10,607	1,043	8,382
Orange	396	423	62,072	-----	51,474
Placer	945	1,542	28,841	177	21,728
Plumas	23	10	593	-----	767
Riverside	384	924	1,536	13	2,600
Sacramento	67	89	41,103	7	35,449
San Benito	139	489	19,457	33	18,974
San Bernardino	126	81	-----	-----	-----
San Diego	2,290	1,147	155	60	195
San Francisco	19	9	3	-----	4
San Joaquin	132	260	20,477	37	14,114
San Luis Obispo	1,502	7,390	64,719	4,758	52,868
San Mateo	363	154	1,013	26	1,162
Santa Barbara	1,118	558	27,787	68	26,308
Santa Clara	5,143	163	4,765	-----	3,596
Santa Cruz	1,505	1,043	799	630	1,444
Shasta	8,792	18,403	17,862	11,606	25,705
Sierra	104	73	2,333	-----	3,940
Siskiyou	3,772	384	14,975	134	23,038
Solano	56	392	157,499	3	161,312
Sonoma	1,544	2,991	75,925	2,330	74,951
Stanislaus	159	217	22,837	50	22,700
Sutter	173	511	149,821	800	110,738
Tehama	10,667	28,473	336,373	36,119	349,689
Trinity	108	845	2,603	44	1,892
Tulare	1,190	2,979	33,150	510	35,218
Tuolumne	1,119	1,609	1,408	177	996
Ventura	1.022	621	21,465	400	14,306
Yolo	322	716	82,602	316	76,497
Yuba	298	502	63,383	208	45,777
Indian reservation	151	-----	-----	-----	-----
Totals	109.021	138.413	2,275,389	102,134	$2,205,928

Goat Hair and Mohair 1909 and 1899. Although 1,714 farmers reported 138,413 goats and kids on their farms April 15, 1910, only 367 reported the production of goat hair or mohair during 1909. These farmers reported 102,134 fleeces, weighing 282,596 pounds and valued at $60,821. The production showed a considerable increase between 1899 and 1909. Many farmers who have goats do not produce goat hair or mohair, but it is believed that the report is somewhat short of the actual production.

TABLE XVI

Counties	Domestic animals on farms and				
	Horses and colts	Cattle	Mules and colts	Asses and burros	Swine (all ages)
Alameda	10,644	24,319	227	3	6,410
Alpine	426	2,754	18	14	517
Amador	2,685	22,266	239	23	5,296
Butte	7,655	*26,584	1,961	18	14,333
Calaveras	3,648	20,977	63	27	4,174
Colusa	4,732	*18,750	5,291	65	28,064
Contra Costa	11,233	26,529	651	6	6,941
Del Norte	441	6,857	3	----------	1,770
El Dorado	2,544	13,048	112	17	2,401
Fresno	25,009	127,625	3,979	101	33,150
Glenn	*3,946	*16,214	3,362	29	18,310
Humboldt	6,403	*53,775	189	11	12,633
Imperial	7,229	*22,741	1,672	56	70,562
Inyo	5,032	20,308	337	309	3,355
Kern	*10,347	*118,320	1,248	130	20,513
Kings	11,473	74,975	1,069	23	40,633
Lake	2,492	7,414	263	10	8,038
Lassen	9,515	43.832	702	119	5,034
Los Angeles	22,424	43,095	2,570	84	28,942
Madera	4,070	*27,905	3,141	49	6,853
Marin	2,558	*39,266	11	----------	16,099
Mariposa	2,240	*16,671	296	83	8,882
Mendocino	5,994	30,154	309	29	22,069
Merced	12,556	*150,467	4,075	107	29,535
Modoc	*15,636	46,916	1,132	98	8,488
Mono	2,097	5,301	136	62	423
Monterey	*17,444	*88,889	642	26	20,031
Napa	5,910	*15,866	372	10	8,344
Nevada	*2,074	8,606	68	10	1,816
Orange	10,565	18,220	2,268	25	4,448
Placer	4,193	*7,510	498	66	3,387
Plumas	2,044	11,401	43	5	1,409
Riverside	10,315	19,468	1,429	88	6,150
Sacramento	9,969	*31,188	743	19	10,455
San Benito	8,475	*39,703	96	29	8,132
San Bernardino	6,878	12,761	778	88	3,749
San Diego	11,498	58,777	766	181	7,391
San Francisco	319	2,510	----------	----------	281
San Joaquin	*20,972	31,296	3,530	62	23,454
San Luis Obispo	15,274	*118,704	877	19	17,868
San Mateo	4,295	15,288	12	2	12,682
Santa Barbara	13,034	*87,576	443	24	22,073
Santa Clara	15,816	*46,030	274	11	7,349
Santa Cruz	4,290	10,100	88	6	3,674
Shasta	5,217	34,119	294	23	18,800
Sierra	1,394	7,787	20	4	664
Siskiyou	9,150	*45,079	503	22	9,512
Solano	8,050	21,784	2,319	23	13,568
Sonoma	13,728	*48,727	398	28	18,423
Stanislaus	*14,357	*49,132	5,442	31	23,027
Sutter	5,684	*16,604	2,096	20	15,129
Tehama	5,876	25,309	1,675	23	14,940
Trinity	1,306	11,885	168	8	4,051
Tulare	*22,200	*104,484	3,655	103	38,192
Tuolumne	2,491	*18,659	91	26	3,893
Ventura	*11,480	*29,929	2,362	60	10,498
Yolo	8,315	18,977	3,955	46	24,197
Yuba	3,244	13,594	800	31	5,539
Totals	*468,886	*2,077,025	69,761	2,592	766,551

*Including animals, age or sex not specified.

SUMMARY.

ranges, 1910		Domestic animals in inclosures (not on farms), 1910				
Sheep—rams, ewes, wethers and lambs	Goats	Cattle	Horses	Mules, asses and burros	Swine	Sheep and goats
9,187	64	2,938	11,439	289	429	3,065
16,640	10	7	16	2	5	22
6,645	1,597	303	492	34	56	------------
45,077	3,215	686	1,835	16	201	23
15,360	3,348	1,056	746	22	107	32
64,592	2,154	479	726	291	172	131
19,595	17	726	1,378	48	103	92
1,841	465	75	114	1	1	------------
3,162	3,315	709	473	20	137	------------
142,011	4,558	1,428	4,525	674	341	58
111,363	2,813	313	694	115	43	5
87,073	3,747	1,363	1,549	20	1,132	165
23,339	147	244	1,278	559	878	435
43,346	2,846	315	902	761	140	16,111
30,317	930	820	3,565	1,482	108	7,597
62,374	507	243	1,005	24	124	5
10,947	9,018	365	395	24	193	34
72,725	586	7,528	25,297	3,425	807	3,025
31,091	8,238	313	743	26	87	18,064
10,106	278	155	436	76	30	1
2,955	147	361	1,227	81	1	26
1,181	931	42	256	75	------------	------------
129,770	3,927	806	1,280	27	348	4
39,768	5,246	130	520	30	69	11,028
76,562	549	433	811	21	156	------------
63,016	25	65	170	16	------------	------------
28,874	3,983	505	1,535	112	53	7
10,878	556	251	899	14	38	91
11,162	2.198	799	946	36	350	89
43,678	423	885	1,923	179	90	649
24,468	1,542	1,076	1,442	162	252	78
1,159	10	162	451	14	79	6
7,009	924	1,163	2,815	249	131	2,833
46,957	89	646	3,917	74	164	80
15,146	489	148	407	4	20	------------
7	81	1,671	2,977	757	409	1,324
289	1,147	1,210	3,303	434	15	118
3	9	2,280	21,184	320	1,243	2,924
24,819	260	840	2,405	67	150	84
86,953	7,390	1,144	1,301	18	52	18
1,329	154	913	1,424	23	964	114
80,533	558	1,010	2,801	73	40	61
10,055	163	1,105	5,156	66	125	116
1,579	1,043	536	1,543	66	65	79
17,023	18,403	948	1,274	60	486	529
3,098	73	180	312	55	35	42
29,922	384	745	1,393	130	229	28
170,153	392	579	1,108	19	24	31
65,315	2,991	959	2,166	23	164	27
23,252	217	653	1,454	99	157	3
89,665	511	387	386	19	83	1,903
297,736	28,473	273	568	6	35	12
3,813	845	508	277	48	106	------------
21,184	2,979	831	1,765	137	100	16
2,466	1,609	740	923	108	319	473
31,771	621	576	1,374	93	280	41
79,446	716	371	834	30	195	43
67,662	502	179	386	15	47	2
2,417,477	138,413	46,176	132,521	11,669	12,168	71,744

POULTRY.

With the exception of the turkey, all the different species of poultry now kept on American farms are of European or Asiatic origin. The fowl, or chicken, is unquestionably of Asiatic origin.

VARIETIES.

The chickens of the United States may be divided into ten classes:

The American class includes the—
Plymouth Rock
Wyandotte
Java
American Dominique
Jersey Blue

The Asiatic class—
Brahma
Cochin
Langshans.

The Mediterranean class—
Leghorn
Minorca
Andalusian
Spanish

The Polish class—
White Crested
Black
Golden
Silver
White and Bearded Golden
Bearded White
Bearded Silver
Buff Laced

The Dutch or Hamburg class—
Hamburgs
Red Caps
Campines.

French class—
Houdans
Crevecœurs
La Fleche

Game and Game Bantam class—
Black-breasted Red
Brown Red
Golden and Silver Duckwing
Red Pyle
White, Black, Birchen, Cornish, and Indian Games.
Malays

Bantams other than Game—
Bebrights
Rose Combed
Booted
White
Cochin
Japanese
Polish

English class—
Dorkings
Orpingtons

Miscellaneous class—
Russian
Sumatra
Silky
Sultan
Frizzles
Rumples
Yokohama
Naked Neck

Classified according to their prominent characteristics, they may be divided into four classes. The egg breeds, which are the greatest egg producers, are the Leghorns, Spanish, Minorcas, and Hamburgs.

The meat breeds, whose chief value is as meat producers: Brahma, Cochin, and Langshan. The general utility fowls furnish fair quantities of eggs and meat. The Plymouth Rock and Wyandotte belong to this class.

The fancy breeds are reared chiefly on account of their appearance: the Polish, Games, Bantams, and some miscellaneaus breeds are the chief representatives of this class.

For general purposes the Plymouth Rock and Wyandotte are the most popular of all fowls, the Plymouth Rock in particular being in great favor.

The turkey is an American bird. The wild turkey was once found all along the Atlantic coast, throughout Mexico, Central America, and the great interior plains of North America. The recognized varieties of the domestic turkey are the Bronze, Narragansett, White, Holland, Buff, Slate, and Black.

DUCKS.

The six leading varieties are the White Pekin, White Aylesbury, Colored Rouen, Black Cayuga, Colored Muscovy, and White Muscovy.

The most prominent breeds of geese are the Toulouse, African, Embden, Chinese, Wild, and Egyptian.

The raising of poultry in California is carried on successfully and on a large scale, the center of this industry being at Petaluma, in Sonoma County.

THE OSTRICH INDUSTRY.*

In January, 1910, there were at least 6,100 breeding or feather-producing ostriches in this country, of which Arizona had 80 per cent, California 17 per cent, Arkansas 2 per cent, the small remainder being in Texas and Florida. There are ostrich farms at Pasadena, Sacramento, and Brawley, in Imperial County.

The question of the nature of the country most favorable for ostriches is largely affected by the kind of vegetation peculiarly suited to the soil, which in turn is undoubtedly affected by the amount of rainfall. Alfalfa pasture makes an ideal run for the birds, furnishing a large percentage of their food; hence a soil which is or can be made suitable for alfalfa is one of the essentials to success in ostrich farming. A dry, sandy soil, made suitable by drainage and irrigation for raising alfalfa, has proved best adapted to successful ostrich farming. Such a soil is generally peculiarly adapted for raising large crops of alfalfa, and makes an ideal soil for an alfalfa pasture. Under such conditions it is essential to have some shade.

The demand for information concerning ostriches indicates that the number of individuals who are interested in ostrich farming is rapidly increasing.

The profit to be derived from the business will depend on the management, on the success secured in the raising of the young birds, and on the production of feathers of good quality. The average yearly yield of feathers from an ostrich is 1¼ pounds. Birds produce from 12 to 20 ounces of feathers at each plucking, with an average of 16 ounces.

There were nine ostrich farms, returning 974 ostriches valued at $224,000. There were also reported peafowls valued at $1,431, pheasants valued at $342, and India Jungle fowls valued at $150. The number of farms reporting poultry increased 10,772 since 1900.

Poultry in California, 1880-1910.

	1880	1890	1900	1910	Value, 1910
Chickens	1,425,991	3,504,251	3,947,200	5,665,964	$3,237,049
Turkeys		287,799	158,356	116,602	258,033
Ducks		157,514	62,293	40,061	28,325
Geese		37,659	28,419	14,195	18,609
Guinea fowls			[1]	2,920	1,993
Pigeons			[2]	246,065	69,254
Ostriches			198	1,082	229,340
All other fowls	184,176	482,972	249,068	378	1,923
Totals	1,610,167	4,470,195	4,196,466	6,087,267	$3,844,526

[1] Included with chickens. [2] Not reported.

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*For further details regarding the ostrich industry, see the Statistical Report of the State Board of Agriculture for 1913.

The farm value of poultry and eggs produced in California is about $18,000,000, according to Mr. George H. Croley, president of the Federated Poultry Association. The leading poultry districts of the state, arranged in order of their importance and value of products, are as follows:

1. Petaluma district, including Santa Rosa and Sebastopol.
2. California south of Tehachapi—eight counties.
3. Hayward-Livermore, including the suburbs of the city of Oakland.
4. Santa Cruz-Watsonville-Salinas.
5. San Jose-Gilroy-Hollister (Santa Clara Valley).
6. Sacramento-Stockton.
7. San Joaquin Valley, excepting that portion included in District No. 6.
8. Sacramento Valley, excepting that portion included in District No. 6.
9. Sonoma-El Verano-Napa.
10. Santa Maria-Arroyo Grande.
11. Martinez-Concord-Walnut Creek (San Ramon Valley).
12. Northwestern Coast District.
13. Northeastern Mountain District.
14. Eastern Mountain District.

The industry is constantly extending, as the demand for poultry products greatly exceeds the home supply. Turkey-farming, as it is called, is mainly in the grain districts where the fowls can range. Hatching by incubators prevails generally.

An average chicken ranch near Petaluma consists of about five acres, upon which are placed 500 to 3,000 hens. There are, of course, quite a number of larger ranches which maintain 5,000 to 30,000 chickens. A person should have from $3,000 to $5,000 to equip a chicken ranch and get ready for a profitable business. In case of renting, however, about $1,500 is needed to start the prospective poultryman. The average profit on each hen is about $1 per year.

Notwithstanding the remarkable development of the poultry business in various parts of the state, the increase is not sufficient to meet the demands of the immediate market. The rapidly expanding population of the state requires the importation in season of about 425 carloads of live and 75 carloads of dressed poultry to San Francisco and Los Angeles, besides several million dozen eggs each year from Eastern points, and there is no immediate prospect of the home supply overtaking the market. This fact insures the success of all practical poultrymen who engage in the industry in California.

Eggs.*

The production of eggs in California in 1909 was 41,022,000 dozen, valued at $10,263,000.

Number of eggs—	Dozens	Value
In 1899	24,443,540	$3,864,679
In 1909	41,022,395	10,262,694
Increase, 1889 to 1909	16,578,855	6,398,015
Per cent of increase	67.8	165.6

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*The center of the poultry industry in California is at Petaluma in Sonoma County.

TABLE XVII.

Poultry and Eggs, 1909-1910.

Counties	Number of poultry raised in 1909	Number of poultry raised in 1910	Dozens of eggs produced in 1909
Alameda	230,417	240,914	1,391,728
Alpine	2,547	2,159	8,904
Amador	23,628	23,630	142,824
Butte	94,183	74,982	377,598
Calaveras	31,410	23,242	107,387
Colusa	73,034	61,113	249,229
Contra Costa	154,332	118,944	664,951
Del Norte	3,357	3,911	13,767
El Dorado	28,499	24,308	132,910
Fresno	266,221	213,108	1,267,840
Glenn	67,529	50,336	252,286
Humboldt	67,310	54,834	332,115
Imperial	84,062	72,252	264,826
Inyo	50,007	30,132	146,952
Kern	89,520	75,900	394,130
Kings	153,839	102,747	687,052
Lake	37,976	27,435	135,001
Lassen	28,907	19,297	106,897
Los Angeles	586,566	513,965	2,332,397
Madera	28,137	23,246	67,932
Marin	141,629	203,277	1,465,911
Mariposa	19,583	12,217	49,728
Mendocino	64,935	56,807	337,781
Merced	136,305	83,998	454,115
Modoc	38,112	23,789	134,731
Mono	2,559	2,515	4,541
Monterey	123,743	128,325	751,177
Napa	105,428	108,777	662,159
Nevada	35,776	23,482	150,596
Orange	239,536	186,746	1,198,290
Placer	62,151	43,619	235,606
Plumas	15,163	9,649	48,511
Riverside	95,767	84,226	438,099
Sacramento	144,704	116,556	666,906
San Benito	79,550	95,289	696,264
San Bernardino	105,606	91,098	579,685
San Diego	174,778	130,158	921,117
San Francisco	196,020	42,649	110,057
San Joaquin	212,434	175,456	955,501
San Luis Obispo	109,871	119,822	840,405
San Mateo	43,946	47,625	236,642
Santa Barbara	91,159	89,995	407,168
Santa Clara	233,729	209,093	1,166,782
Santa Cruz	79,015	85,705	577,989
Shasta	52,607	35,873	199,858
Sierra	6,993	4,458	24,877
Siskiyou	57,444	43,413	254,107
Solano	66,403	74,683	426,261
Sonoma	1,512,601	1,362,399	9,470,880
Stanislaus	121,677	128,905	648,248
Sutter	101,908	68,861	420,198
Tehama	96,134	59,852	306,452
Trinity	10,800	7,712	31,776
Tulare	204,167	191,965	1,033,110
Tuolumne	22,710	15,989	94,507
Ventura	61,703	60,921	372,111
Yolo	84,010	76,972	347,209
Yuba	44,202	27,936	111,892
Totals	7,096,339	6,087,267	35,907,973

DAIRY PRODUCTS.

Dairy products in general are somewhat less accurately reported than the principal crops. This is particularly the case as regards the quantity of milk produced. Less than one-third of the milk produced was sold as such. Large quantities of milk and cream were sold on the butter fat basis. The butter made on farms in 1909 was valued at $4,086,000.

Dairy Products and Their Value.

(From report of Census Bureau.)

Dairy cows and products	Number	Value
Dairy cows on farms, April, 1910	467,332 head	----------
On farms reporting dairy products in 1909	408,812 head	----------
On farms reporting milk produced in 1909	315,385 head	----------
Specified dairy products, 1909:		
Milk	154,901,956 gals.	----------
Butter	15,301,871 lbs.	$4,085,992
Cheese	2,777,873 lbs.	383,494
Milk sold	45,333,432 gals.	7,346,176
Cream sold	3,397,061 gals.	2,861,921
Butter fat sold	19,176,719 lbs.	5,766,394
Butter sold	10,285,583 lbs.	2,763,392
Cheese sold	2,513,815 lbs.	345,414
Total receipts from sales, 1909	----------	$19,083,297
Total value of milk, cream, and butter fat sold, and butter and cheese made	----------	20,443,977

CHEESE AND BUTTER.

The production of cheese and butter, as given by counties by the Census Bureau, is that made on farms only. The production by creameries in 1909 was 37,283,450, and full cream cheese 1,567,640 pounds. The decrease from 1904, when it amounted to 3,601,051, is, no doubt, due in part to the increasing practice of separating the cream on the farm, as it is now more profitable to sell the separated cream to the butter factories. The figures issued by the State Dairy Bureau are also given. The cheese produced is, with a few exceptions, only that made by the ordinary Cheddar process. There is a considerable amount of fancy and handmade cheese which has not been reported. That the production of cheese in the state is far below the demand, is proved by the fact that more than double the amount manufactured in this state is received in the San Francisco market alone. We have the finest land for pasture and conditions favorable for the production of this article.

The amount of the output of cheese reported is much below the actual production in the state, and it is impossible to estimate it, as the owners of factories constantly change from making cheese to the production of cream. It has never been attempted to get a report on other than that made by the ordinary Cheddar process.

The supply from Europe being nearly exhausted some time ago some enterprising cheese makers who are familiar with the process of making these types of cheese have built large factories and hope to have a ready sale for the product in this country. One large factory, making Parmesan cheese, is running at full capacity in Sonoma County.

Cheese has been sold at a fair average price (15.54 cents per pound) during the year ending September 30, 1916. As may be seen from Table No. 11 this is just about an average of the prices obtained for it during the last ten years.

It has been demonstrated that a Cheddar type of cheese of the finest quality can be made in California, but most of the cheese made in this state is made for immediate consumption and is not suitable for exportation. There are, however, some factories in California that make cheese by the same process as is used in Oregon, Wisconsin and New York and the quality of some of these brands is equal to any cheese made in the above-named states.

TABLE XVIII.

Butter and Cheese Produced on Farms. 1910.*

(Compiled from the returns of the Bureau of the Census.)

(Pounds.)

Counties	1889		1899		1909	
	Butter	Cheese	Butter	Cheese	Butter	Cheese
Alameda	509,614	62,132	526,978	6,716	252,603	675
Alpine	25,075	110	12,495	----------	28,613	500
Amador	168,436	4,395	91,584	5,184	68,812	32,517
Butte	178,329	1,143	149,200	40	124,437	----------
Calaveras	35,546	550	66,946	1,155	51,841	2,787
Colusa	177,100	100	107,222	----------	75,829	272
Contra Costa	315,181	27,802	449,511	21,046	226,976	9,790
Del Norte	455,960	----------	300,990	----------	461,303	----------
El Dorado	216,790	9,125	162,072	9,200	176,354	3,734
Fresno	382,744	11,370	609,676	122,058	514,946	41,210
Glenn	----------	----------	----------	----------	86,762	----------
Humboldt	1,922,282	9,712	791,850	81	475,773	----------
Imperial	----------	----------	----------	----------	71,581	1,400
Inyo	55,316	3,373	47,813	185	116,364	5,426
Kern	104,633	88,850	142,392	12,403	73,839	30,051
Kings	----------	----------	145,704	2,575	78,295	139,000
Lake	119,349	350	121,186	102	92,723	200
Lassen	200,691	5,650	235,258	69,763	279,685	160
Los Angeles	676,575	250,890	509,757	5,243	323,374	1,643
Madera	----------	----------	----------	----------	48,459	----------
Marin	3,928,009	3,000	3,234,320	4,870	2,289,217	101,743
Mariposa	21,158	695	35,760	196	12,753	----------
Mendocino	375,445	22.000	349,840	3,924	355,048	1,357
Merced	153,467	4,420	138,243	98,595	94,602	200,840
Modoc	142,057	10,150	127,930	----------	153,175	3,680
Mono	55,093	870	29,832	1,325	30,202	----------
Monterey	1,743,162	101.600	712,845	559,923	286,450	59,680
Napa	405,587	43,070	395,494	51,260	381,930	35,826
Nevada	147,042	100	119,236	----------	158,271	1,970
Orange	295,146	3,480	220,218	938	333,283	50
Placer	195,507	520	217,508	----------	108,876	30,545
Plumas	531,549	15,378	474,599	30,170	237,330	2,500
Riverside	----------	----------	298,345	208	312,248	650
Sacramento	725,404	230,455	551,020	543,356	164,427	497,064
San Benito	215,545	572,262	223,333	124,351	74,131	137,685
San Bernardino	303,420	1,460	249,439	----------	207,745	362
San Diego	408,915	4,472	448.076	7,204	575,662	2,895
San Francisco	7,805	200	104,150	10	144	----------
San Joaquin	326,880	1,755	351,312	3.713	341,820	93,630
San Luis Obispo	3,322,918	417,791	1,286,289	135,023	1,369,563	169,350
San Mateo	655,008	521,936	349,421	509,714	91,997	64,751
Santa Barbara	1,055,380	94,235	821,804	57,773	244,632	25,665
Santa Clara	351,248	491,876	484,856	514,563	320,236	577,350
Santa Cruz	425,071	383,165	405,504	372,749	224,392	227,905
Shasta	111,484	6,000	122,610	148	137,723	----------
Sierra	123,598	170	114,546	----------	135,938	1,318
Siskiyou	312,814	27,000	279,776	35,065	254,999	39,470
Solano	579,422	650	505,128	2,364	381,903	873
Sonoma	2,971,664	234,000	2,093,892	121,695	1,192,532	211,319
Stanislaus	143,231	25,160	153,026	228,363	154,998	2,125
Sutter	160,612	45,300	151,809	249,638	183,527	----------
Tehama	125,425	430	160,711	7,599	182,953	----------
Trinity	15,509	----------	34,433	----------	46,277	----------
Tulare	354,368	35,738	329,018	1,407	201,880	16,850
Tuolumne	27,716	525	60,150	60	35,522	155
Ventura	226,792	84,840	270,109	624	267,905	----------
Yolo	195,879	----------	233,345	326,706	88,338	----------
Yuba	93,153	11,320	83,695	----------	40,673	900
Totals	26,776,704	3,871,575	20,853,360	4,249,588	15,301,871	2,777,873

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*This is made on farms, and does not include the amount made in creameries or factories, which is very much larger.

SUMMARY OF BUTTER AND CHEESE PRODUCED ON FARMS.

(Compiled from the returns of the Bureau of the Census.)

Butter, 1850-1910.

Year	Made on farms (pounds)	Made in factories (pounds)	Total (pounds)
1850	705		705
1860	3,095,035		3,095,035
1870	7,969,744		7,969,744
1880	14,084,405	2,074,344	16,158,749
1890	26,776,704	271,767	27,048,471
1900	20,853,360	13,147,137	34,000,497
1910	15,301,871	37,283,450	52,585,321

Cheese, 1850-1910.

Year	Made on farms (pounds)	Made in factories (pounds)	Total (pounds)
1850	150		150
1860	1,343,689		1,343,689
1870	3,395,074		3,395,074
1880	2,566,618	1,154,121	3,720,739
1890	3,871,575	1,091,222	4,962,797
1900	4,249,588	2,676,543	6,926,131
1910	2,777,873	1,567,640	4,345,513

TABLE XIX.

Production of Butter and Cheese in California, 1915-1916.

(Compiled from the returns of the State Dairy Bureau. For year ending September 30.)

Butter.

County	1915, pounds	1916, pounds	County	1915, pounds	1916, pounds
Alameda	437,401	450,688	Orange	74,000	75,000
Alpine	27,000	28,000	Placer	128,904	133,542
Amador	114,890	133,953	Plumas	320,866	231,931
Butte	1,124,710	2,073,297	Riverside	245,270	229,692
Calaveras	133,197	137,207	Sacramento	1,737,511	1,422,051
Colusa	566,512	414,226	San Benito	438,386	349,633
Contra Costa	621,575	730,474	San Bernardino	100,000	92,300
Del Norte	887,500	842,280	San Diego	593,384	441,409
El Dorado	127,958	132,853	San Joaquin	1,184.658	1,618,455
Fresno	3,158,220	4,204,416	San Luis Obispo	2,759,751	2,303,547
Glenn	1,258,020	1,725,746	San Mateo	327,448	260,880
Humboldt	5,591,870	5,588.604	Santa Barbara	510,460	926,487
Imperial	6,334,316	6.780,552	Santa Clara	309,552	291,883
Inyo	303,309	339,677	Santa Cruz	274,439	233,666
Kern	982,694	971,811	Shasta	123,000	146,850
Kings	3,811,477	3,960,949	Sierra	150,000	308,908
Lake	101,953	107,560	Siskiyou	880,013	942,370
Lassen	220,000	177,433	Sonoma	2,965.893	3,071,474
Los Angeles	567,621	167,286	Solano	1,043,303	923,498
Madera	462,501	386,330	Stanislaus	9,973,320	9,980,021
Marin	2,338,338	2,475,329	Sutter	969,594	1,048.270
Mendocino	498,779	550.285	Tehama	473,733	501,396
Merced	4,253,000	4.028,062	Tulare	4,787,690	4,677,839
Modoc	85,534	232.561	Ventura	34,588	29,321
Mono	10.000	11,000	Yolo	1.091,496	1,241,083
Monterey	939,483	810,235	Yuba	252,164	303,777
Napa	600,439	586,503			
Nevada	241,689	197,574	Totals	67,549,409	70,030,174

Cheese.

County	1915, pounds	1916, pounds	County	1915, pounds	1916, pounds
Alameda	----------	19,136	Sacramento	427,065	386,920
Amador	13,688	10,543	San Benito	202,484	366,001
Butte	79,200	80,300	San Joaquin	117,302	120,557
Colusa	32,400	36,500	San Luis Obispo	134,662	175,963
Contra Costa	----------	14,352	San Mateo	152,690	159,565
Del Norte	----------	67,335	Santa Barbara	----------	163,750
Fresno	445,945	607,185	Santa Clara	1,089,288	812,351
Humboldt	544,350	430,030	Santa Cruz	228,169	245,974
Imperial	61,000	210.990	Shasta	----------	38,485
Kern	43,750	30,000	Sierra	4,000	13,335
Lassen	113,988	110,719	Siskiyou	72,480	86,969
Los Angeles	200	659,902	Solano	----------	19,136
Marin	476.180	447,320	Sonoma	271,753	378,796
Mendocino	144,000	101,366	Stanislaus	67,200	480,657
Merced	142,375	54,500	Sutter	158,735	73,650
Modoc	168,665	54,068	Tehama	1,000	----------
Mono	12,000	12,000	Tulare	54,000	86,700
Monterey	800,789	1,031,384	Yolo	6,030	46,795
Napa	26,087	2,890	Yuba	147,000	109,000
Plumas	2,800	----------			
Riverside	8,500	----------	Totals	6,249,775	7,745,124

Summary of Butter, Cheese, and Condensed Milk Production, 1906-1916.

(Compiled from the reports of the State Dairy Bureau.)

Year	Butter, pounds	Cheese, pounds	Condensed milk, cases	Year	Butter, pounds	Cheese, pounds	Condensed milk, cases
1906	44,044,578	6,418,480	113,025	1912	54,940,886	4,785,617	172,309
1907	44,599,211	5,928,942	134,907	1913	55,542,709	5,600,972	172,800
1908	48,469,585	6,262,194	100,069	1914	59,286,460	6,016,815	274,096
1909	43,899,018	4,431,194	83,476	1915	67,522,409	6,105,775	345,402
1910	45,989,141	4,648,348	172,916	1916	70,030,174	7,745,124	379,212
1911	50,380,736	4,580,495	116,384				

Receipts of Butter in San Francisco, 1906-1916.

Year	Pounds	Year	Pounds
1906	*	1912	23,548,850
1907	15,384,137	1913	23,905,100
1908	14,610,522	1914	22,580,950
1909	14,328,000	1915	27,323,500
1910	13,934,200	1916	27,877,700
1911	19,033,600		

*Not available owing to the fire.

Annual Value of Dairy Products, 1915-1916.

Products	Value
1915.	
Butter, 67,549,409 pounds	$19,386,680
Cheese, 6,249,775 pounds	881,218
Condensed, evaporated and powdered milk, 16,579,317 pounds	1,352,959
Casein, 690,750 pounds	34,537
Market milk, cream and ice cream	12,000,000
Calves produced on dairies	3,000,000
Skim milk and buttermilk	1,750,000
Total	$38,405,394
1916.	
Butter, 70,030,174 pounds	$19,181,264
Cheese, 7,745,124 pounds	1,203,592
Condensed, evaporated and powdered milk, 18,610,236 pounds	1,488,818
Casein, 1,864,317 pounds	186,431
Market milk, cream and ice cream	14,000,000
Calves produced on dairies	2,500,000
Skim milk and buttermilk	1,750,000
Total	$40,310,105

Butter and Cheese Prices in San Francisco Market, 1913-1916.

(Cents per pound.)

Month	1913-1914		1914-1915		1915-1916	
	Butter	Cheese	Butter	Cheese	Butter	Cheese
October	32.48	17.03	32.50	17.00	26.90	16.46
November	32.56	18.37	34.00	16.50	28.59	16.68
December	31.85	17.69	31.50	13.50	27.36	16.04
January	29.92	18.06	32.00	15.00	28.00	16.40
February	28.19	18.89	30.50	14.00	30.54	17.33
March	22.85	16.45	27.50	14.50	28.02	17.91
April	23.06	14.76	23.50	13.00	26.24	15.14
May	23.83	13.52	24.00	12.00	24.78	12.82
June	24.02	12.99	26.00	11.50	24.94	14.58
July	24.55	13.23	27.00	13.00	26.00	14.09
August	27.26	14.08	28.00	13.00	26.83	14.23
September	30.81	14.37	28.00	16.00	30.56	14.75
Average	27.61	15.79	28.70	14.10	27.39	15.54

Receipts of Butter and Cheese in San Francisco for the Two Years Ending September 30, 1916.

Month	1914-1915 (Pounds)		1915-1916 (Pounds)	
	Butter	Cheese	Butter	Cheese
October	1,463,600	841,500	1,921,100	869,200
November	1,315,400	548,800	1,732,400	748,000
December	1,735,100	538,300	1,832,500	828,700
January	1,539,600	508,400	1,790,600	767,700
February	1,553,800	488,000	1,766,200	707,800
March	2,575,500	603,400	2,468,600	946,200
April	2,996,300	775,800	3,404,000	1,276,600
May	3,154,866	796,600	3.259,000	1,626,000
June	2,775,334	1,403,300	3,066,000	1,865,400
July	3,598,000	1,455,200	2,212,500	2,100,800
August	2,591,400	1,248,900	2,283,800	1,612,400
September	2,023,800	1,392,400	2,141,000	1,111,800
Totals	27,323,500	10,600,600	27,877,700	14,460,600

Imports and Exports.

About 50,000,000 pounds of cheese is imported, and on an average of about 3,000,000 pounds of domestic cheese is exported, but the imports in 1916 fell off to 30,000,000 pounds, and the exports having increased from 2,400,000 pounds in 1914 to 55,300,000 in 1915, decreased to 44,300,000 pounds. The duty on imported butter is $2\frac{1}{2}$ cents per pound, and cheese 20 per cent ad valorem on October 4, 1913, and after.

BEES, HONEY, AND WAX.

In the earlier years the parent stock of the honey bee in this country was the common brown or black bee of Germany. In 1860 the Department of Agriculture introduced the Italian bee, about twenty years later the Cyprian, and still later the Carniolan.

Summary of Honey and Wax, 1860-1910.

(From census reports.)

Year	Honey, pounds	Wax, pounds	Year	Honey, pounds	Wax, pounds
1860	12,276	584	1890	3,929,889	60,237
1870	294,326	4,903	1900	3,667,738	115,330
1880	574,029	14,672	1910	10,264,715	126,445

The number of farms reporting bees decreased from 6,915 in 1909 to 6.870 in 1910, while the colonies of bees increased from 129,444 to 201,023, or 55.3 per cent, and the value increased from $363.885 to $729,793, or 100.6 per cent.

The average production of honey is 70 pounds to the colony, and the average value 6 cents per pound. The price varies according to color and quality, the extracted honey from 4 to 7½ cents, and comb honey from 10 to 18 cents per pound. In many portions of the state great loss is caused by American and European foul brood, commonly called black brood, the percentage of damage having steadily risen from 7 per cent in 1909 to 20 per cent in 1912, and 25 per cent in southern California in 1913.

Production of Honey, 1902-1916.

Year	Pounds	Year	Pounds
1902	5,125,000	1910	4,500,000
1903	8,400,000	1911	5,600,000
1904	1,040,000	1912	4,800,000
1905	9,500,000	1913	3,200,000
1906	5,250,000	1914	7,900,000
1907	6,550,000	1915	9,300,000
1908	5,250,000	1916	15,600,000
1909	10,500,000		

TABLE XXI.

Bees, Beeswax, and Honey by Counties.

(From census reports.)

Counties	Colonies, 1909	Honey, pounds, 1909	Beeswax, pounds, 1909
Alameda	610	6,848	179
Alpine	49	220	----------
Amador	170	2,402	100
Butte	1,384	9,702	170
Calaveras	362	8,413	118
Colusa	1,406	67,689	798
Contra Costa	698	15,950	284
Del Norte	78	1,395	----------
El Dorado	464	8,105	75
Fresno	9,242	616,609	7,261
Glenn	420	10,982	250
Humboldt	1,803	23,481	367
Imperial	4,740	514,125	4,453
Inyo	5,868	312,620	2,131
Kern	4,501	204,920	2,832
Kings	4,690	238,791	3,148
Lake	276	5,105	43
Lassen	298	5,642	5
Los Angeles	25,930	1,289,820	15,501
Madera	375	16,439	370
Marin	20	205	55
Mariposa	34	300	25
Mendocino	441	6,090	34
Merced	4,072	204,098	3,150
Modoc	839	19,796	232
Mono	438	20,355	425
Monterey	3,669	177,279	2,619
Napa	524	8,939	204
Nevada	260	5,452	42
Orange	5,159	325,656	2,764
Placer	657	7,338	80
Plumas	121	2,280	5
Riverside	18,900	902,106	12,915
Sacramento	1,835	55,272	160
San Benito	1,777	68,253	773
San Bernardino	8,073	363,025	5,983
San Diego	30,566	1,559,607	18,589
San Francisco	6	----------	----------
San Joaquin	3,014	104,645	3,459
San Luis Obispo	3,936	177,342	1,983
San Mateo	289	5,458	193
Santa Barbara	4,072	288,875	4,060
Santa Clara	2,542	77,252	842
Santa Cruz	693	11,032	98
Shasta	689	8,466	185
Sierra	49	2,081	10
Siskiyou	2,775	85,322	324
Solano	256	2,873	----------
Sonoma	824	7,014	44
Stanislaus	2,554	61,592	1,371
Sutter	2,055	76,812	745
Tehama	786	15,779	115
Trinity	98	1,605	13
Tulare	9,568	290,435	4,743
Tuolumne	363	12,310	65
Ventura	23,714	1,839,986	20,918
Yolo	2,442	106,982	1,125
Yuba	149	545	10
Totals	201,023	10,264,715	126,445

CALIFORNIA HONEY CROP, AND IMPORTS AND EXPORTS OF HONEY AND WAX, 1902-1916.*

(Duty on imported honey, 10 cents per gallon.)

Year	California, crop, pounds	Exports of domestic honey, value	Imports, gallons	Value
1902	5,125,000	106,112	167,301	56,383
1903	8,400,000	64,220	287,696	115,400
1904	1,040,000	69,317	206,292	69,053
1905	9,500,000	63,367	198,617	76,719
1906	5,250,000	111,945	138,221	50,651
1907	6,500,000	93,690	175,672	70,854
1908	5,250,000	78,102	211,992	98,425
1909	10,500,000	85,578	145,691	60,884
1910	4,500,000	159,401	103,640	52,968
1911	9,500,000	81,649	112,553	62,942
1912	4,800,000	212,652	115,040	62,684
1913	3,200,000	182,252	116,271	68,717
1914	7,900,000	135,669	75,079	38,665
1915	9,300,000	114,038	303,965	124,843
1916	15,600,000	252,487	221,224	97,461

*For the statistics previous to 1900, see the Report for 1913, pages 64, 66.

IMPORTS AND EXPORTS OF BEESWAX, 1900-1916.

(Duty free.)

Year	Exported domestic		Imported	
	Pounds	Value	Pounds	Value
1900	319,379	$91,913	213,813	$51,526
1901	140,276	39,464	213,773	55,884
1902	125,283	36,541	408,706	115,937
1903	70,811	21,337	488,576	127,220
1904	55,631	16,545	425,168	116,878
1905	85,406	24,966	373,569	101,121
1906	101,726	29,894	587,617	168,014
1907	117,169	36,392	917,088	264,637
1908	90,506	28,659	671,526	194,769
1909	77,547	23,293	764,937	231,559
1910	89,890	27,740	972,145	282,905
1911	101,735	31,404	902,904	270,112
1912	109,478	32,556	1,076,741	328,752
1913	116,296	33,131	828,793	253,867
1914	96,215	27,292	1,412,200	476,364
1915	181,328	57,971	1,564,506	439,541
1916	147,772	48,252	2,146,380	594,209

PART IV.

FARM CROPS.

Farm Crops 1910-1916: Cereals, Potatoes, Hay and Forage; Production of Wheat in the State; Sugar Beets, Cotton, Rice, and Hops; Beans and Other Vegetables; Celery and Onions; Canned Vegetables; the Cork Industry; Ginseng; Flowers, Plants and Nursery Products; Farm Crops for Twenty-five Years; Value of All Crops; Farm Crops by Counties.

In comparing one year with another it should be borne in mind that acreage is, on the whole, a better index of the general change or tendencies of agriculture than either the quantity or the value of the crops, since variations in quantity may be due largely to temporarily favorable or unfavorable climatic conditions, and variations in the value of the crops are largely affected by changes in prices. The acreage in fruits and nuts can not be given, as the extent of the industry has always been calculated by the number of trees only.

Crops	Acreage, 1909	Value
Cereals	1,970,492	$28,039,826
Other grains and seeds	163,776	6,517,453
Hay and forage	2,533,347	42,187,215
Tobacco	4	479
Cotton (including cotton seed)	324	12,776
Hemp	300	39,000
Hops	8,391	1,731,110
Broom corn	1,023	32,509
Sugar crops	79,604	4,335,358
Sundry minor crops	7	840
Potatoes and sweet potatoes and yams	72,799	5,235,073
Other vegetables	79,163	6,886,885
Flowers, plants, and nursery products	5,816	3,601,301
Small fruits	9,687	1,789,214
Totals	4,924,733	$100,409,039
Seeds		$800,758
Fruits and nuts		48,917,655
Forest products of farm		2,949,732
Miscellaneous		33,829
Total		$52,701,974

Summary of California Crops Harvested in 1909.

(Compiled from reports of the Bureau of the Census.)

Crop cereals	Number of farms reporting	Acres	Amount	Value
			Bushels	
Corn	5,728	51,935	1,273,901	$1,077,411
Oats	2,477	192,158	4,143,688	2,637,047
Wheat, total		478,217	6,203,206	6,323,983
Common winter	3,628	413,687	5,168,210	5,311,387
Common spring	1,075	64,070	1,029,907	1,006,819
Durum or macaroni	7	460	5,089	5,777
Emmer and spelt	19	840	19,755	13,758
Barley	7,597	1,195,158	26,441,954	17,184,508
Buckwheat	26	849	14,681	11,569
Rye	193	7,027	70,683	65,846
Kaffir corn and Milo maize	2,521	44,308	938,049	725,704
Total cereals		1,970,492	39,105,917	$28,039,826
Hay and forage—				
			Tons	
Timothy alone	370	13,725	20,001	$185,579
Timothy and clover mixed	958	46,661	73,183	629,575
Clover alone	703	8,519	20,380	213,289
Alfalfa	19,904	484,134	1,639,707	13,088,530
Millet or Hungarian grasses	101	2,142	2,688	27,483
Other tame or cultivated grasses	2,274	90,414	119,415	1,253,428
Wild, salt or prairie grasses	3,679	253,127	281,033	2,028,494
Grains cut green	39,397	1,604,745	2,019,526	24,056,727
Coarse forage	2,175	25,868	60,611	438,095
Root forage	1,021	4,012	90,586	266,015
Totals	53,760	2,533,347	4,327,130	$42,187,215
Sundry crops—				
			Bushels	
Potatoes	12,533	67,888	9,824,005	$4,879,449
Sweet potatoes and yams	1,133	5,111	572,814	355,624
Tobacco	12	4	[1]4,502	479
Cotton	18	324	[2]183	11,744
Cotton seed (estimated), 92 tons				1,032
Hops	273	8,391	[1]11,994,953	1,731,110
Hemp	2	300	[1]600,000	39,000
Broom corn	24	1,023	[1]614,250	32,509
Sundry minor crops		7		840
Other grains and seeds—				
			Bushels	
Dry edible beans	3,054	157,987	3,328,218	$6,295,457
Horse beans	67	150	5,534	5,659
Dry peas	262	2,959	57,468	101,016
Peanuts	42	99	2,991	2,889
Flaxseed	8	240	1,882	3,224
Mustard seed	66	1,964	63,365	100,731
Sorghum cane seed	14	103	1,147	1,997
Sunflower seed	21	257	6,855	6,264
Timothy seed	4		357	1,065
Clover seed	10		310	2,823
Alfalfa seed	347		23,791	200,823
Other tame grass seed	5		1,077	1,323
Flower and garden seeds	109			594,724
Totals		163,776	3,467,885	$6,517,453

[1]Pounds. [2]Bales.

Size of Cereal Crops in California.

The acreage sown to wheat and other cereal crops in California has greatly decreased in recent years, the land being devoted to orchards and vineyards, which yield a much higher profit.

Barley.

California, however, has held the first place in the production of barley for a number of years, as far back as the year 1852. The area in barley has been upwards of 1,000,000 acres since 1901, the largest area being in 1910, with 1,195,000 acres. The yield per acre varied from 16.7 bushels in 1900 to 31.0 in 1910, when the production was 46,500,000 bushels, or the largest on record. In 1916 the estimated acreage was 1,190,000, and the production 33,320,000 bushels.

Buckwheat.

This crop has never been grown to any extent in California; therefore, the production being so small, regular records have not been kept. The area under cultivation is but a few hundred acres, and the production from 10,000 to 15,000 bushels.

Corn.

Corn has also fallen off; the acreage was between 100,000 and 161,000 in former years, the highest production being in 1891, when it amounted to upward of 5,570,000 bushels. In 1916 the production was 2,048,000 bushels, classified as follows: white, 1,106,000, or 54 per cent; yellow, 922,000, or 45 per cent; mixed, 20,000, or 1 per cent. The total crop in the United States was almost equally divided between white corn and yellow corn, white comprising 41 per cent, yellow 43.1 per cent, and mixed 15.9 per cent.

The corn crop is by far the most valuable single crop grown in the United States. It is distinctly an American Crop, about 75 per cent of the "world" yearly production of approximately three and a half billion bushels being grown in the United States. What becomes of this vast quantity of corn is frequently asked. Answers to inquiries sent to crop correspondents of the Bureau of Statistics of the United States Department of Agriculture permit some interesting deductions to be made upon this subject.

The average annual production of corn in the United States in the last few years (not including the bumper crop of 1912) was about 2,700,000,000 bushels. Of this it is estimated that about 26 per cent, or 702,000,000 bushels, were marketed, 8 per cent (216,000,000 bushels) remaining in the near-by towns, 11 per cent (297,000,000 bushels) going to distant towns or for export, and 7 per cent (189,000,000 bushels) going to distant farms.

The disposition of the 513,000,000 bushels estimated as used in "towns" (as distinguished from "farm" consumption) was approximately as follows:

	Bushels	Per cent of total crop
Used in flour and grist mills (census)	245,000,000	9.1
Used in the manufacture of glucose and starch	40,000,000	.5
Used in manufacture of distilled liquors, 1910	21,000,000	.8
Used in manufacture of malt liquors	14,000,000	.5
Used for feed in towns	120,000,000	4.4
Exported	45,000,000	1.7
Balance indefinite	28,000,000	1.0
Totals	513,000,000	19.0

Materials Used to Make Alcoholic Liquors in the United States During the Fiscal Year Ended June 30, 1916.

(United States Internal Revenue figures.)

Material (bushels)	For fermented liquors[1]	For distilled spirits	Total
Malt	52,439,973	4,073,262	56,513,235
Corn	[2]13,573,521	32,069,542	45,643,063
Rye	[4]	3,116,612	3,116,612
Oats	[4]	9,807	9,807
Wheat	[4]	3,373	3,373
Barley	[4]	148	148
Rice	[3]2,354,000	[4]	2,354,000
Other materials	72,355	68,822	141,177
Total grain, included above	68,439,849	39,341,566	107,781,415
Grape sugar or maltose (pounds)	54,934,621	[4]	54,934,621
Hops (pounds)	37,451,610		37,451,610
Molasses (gallons)	[4]	152,142,232	152,142,232
Glucose or sirup (gallons)	2,742,854	[4]	2,742,854
Other materials:			
In gallons	19,112		19,112
In pounds	24,756,974		24,756,974

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[1] Totals for materials used for fermented liquors were compiled by the Bureau of Crop Estimates, United States Department of Agriculture, from unpublished records of the Commissioner of Internal Revenue.

[2] Includes cerealine and grits.

[3] Rice, reported as 141,249,292 pounds. Estimated roughly as 2,354,000 bushels.

[4] Included, if any, in "Other materials."

Oats.

In oats the acreage has increased from 153,000 acres in 1900 to 192,000 in 1910 and 200,000 in 1916.

Rye.

Rye has always been a small crop in California, and the area and production have fallen off greatly in recent years, the acreage being 62,925 in 1900 and 7,027 in 1910. In 1916 the acreage was 8,000 and the production 104,000 bushels.

Wheat.

In wheat the production decreased heavily between 1900 and 1910, while potatoes, hay, and hops all showed an increase. The acreage in wheat in 1915 was 440,000, and in 1916, 350,000 acres and the production 5,600,000 bushels.

Broom Corn.

This crop has never been grown to any extent in California. The production from 1880 to 1910 has been: In 1880, 191,600 pounds; 1890, 815 acres and 611,975 pounds; 1900, 1,669 acres, 1,146,000 pounds, and 1910, 1,023 acres, and 614,250 pounds.

Potatoes.

The acreage in potatoes in 1916 was 75,000, compared with 78,000 the previous year, and the production 10,575,000 bushels, compared with 10,140,000 in 1915.

Sweet Potatoes.

In 1915 the acreage in sweet potatoes was about 6,000, and the production 810,000 bushels, and in 1916 the same acreage produced 960,000 bushels.

Hay (Tame).

The acreage in hay in 1915 was 350,000, compared with 2,700,000 the previous year. In 1916 the acreage was 2,500,000, and the production 4,375,000 tons.

SUMMARY OF FARM CROPS, 1850-1910.*

(Compiled from the reports of the Bureau of the Census.)

Year	Barley		Buckwheat		Corn	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
1850		9,712				12,236
1860		4,415,426		76,887		510,708
1870		8,783,490		21,928		1,221,222
1880	586,350	12,463,561	1,012	22,307	71,781	1,993,325
1890	815,995	17,548,386	664	10,388	70,303	2,381,270
1900	1,029,647	25,149,335	395	7,835	53,930	1,477,093
1910	1,195,158	26,441,954	849	14,681	51,935	1,273,901

Year	Oats		Rye		Wheat	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
1850						17,328
1860		1,043,006		52,140		5,928,470
1870		1,757,507		26,275		16,676,702
1880	49,947	1,341,271	20,281	181,681	1,832,429	29,017,707
1890	57,569	1,463,068	27,413	243,871	2,840,807	40,869,337
1900	153,734	4,972,356	62,925	524,451	2,683,405	36,534,407
1910	192,158	4,143,688	7,027	70,683	478,217	6,203,206

Year	Potatoes		Hay		Hops	
	Acres	Bushels	Acres	Tons	Acres	Pounds
1850		9,292		2,038		
1860		1,789,463		305,655		80
1870		2,049,227		551,773		625,064
1880		4,550,565	758,024	1,045,119		1,444,077
1890	38,178	3,664,920	1,431,574	2,218,285	3,974	6,547,338
1900	42,098	5,242,596	2,339,601	3,035,266	6,890	10,124,660
1910	67,688	9,824,005	2,533,347	4,327,130	8,391	11,994,953

*When blank, the acreage or production, if any, was not reported.

The hay crop in 1915 has been estimated by kinds of hay for the first time by the Department of Agriculture. The classification used was the same as used in the 1910 census. Estimate for 1915 and Census Report for 1909 are given below:

	1915, estimate		1909, census	
	Tons	Per cent	Tons	Per cent
Timothy	19,054,000	22.3	17,985,000	26.1
Timothy and clover mixed	18,713,000	21.9	24,749,000	36.0
Clover alone	12,527,000	14.7	3,158,000	4.6
Alfalfa	18,562,000	21.8	11,860,000	17.2
Millet and Hungarian grass	3,230,000	3.8	1,547,000	2.2
Grains cut green for hay	6,962,000	8.2	5,367,000	7.8
Other tame hay	6,205,000	7.3	4,167,000	6.1
Total tame hay	85,225,000	100.0	68,833,000	100.0
Wild, salt, and prairie hay	21,491,000		18,384,000	
Coarse forage			9,982,000	

The most striking changes in the estimated production that year as compared with the figures for 1909, aside from the increase in total production, are large increase in the proportion credited to clover hay, the decrease in the proportion of timothy and clover mixed, and the increase in alfalfa.

SOME MINOR CROPS.

The cultivation of rice keeps making great progress, as also does cotton in Imperial Valley. In 1915, the acreage in rice in the Sacramento Valley amounted to 28,975, Butte County leading with 15,200 acres, Colusa being second with 8,750 acres. In the San Joaquin Valley there were 3,125 acres, Fresno County leading with 1,120 acres. There were 10 acres in Imperial, and 10 in Ventura counties, bringing up the total to over 32,000 acres. The total production of rice was approximately 888,000 sacks of 100 pounds each. In 1914 there were only 16,000 acres in rice, and the crop amounted to about 440,000 sacks. In 1916 the acreage was 65,000, and will be larger the coming season.

Beet sugar shows an increase. The number of factories operating in 1915 was 11, the acreage harvested 122,737, and the quantity of sugar beets worked 1,249,111 short tons. In 1916 the output was the largest on record amounting to upwards of 274,000,000 pounds.

Cotton. The cultivation of cotton in California has become of commercial importance within the past eight years. In 1914 there were 15,000 acres in Imperial Valley, and in 1915 the area was about the same, owing to the financial depression in the previous season, when cotton sold at from 6 cents to 8 cents a pound. In 1916, 55,000 acres were planted.

The hop crop was a good one, amounting to 118,000 bales of about 185 pounds, compared with 110,000 bales in 1914, but the coming season is likely to show a falling off.

Tobacco was raised for a year or two, mostly in Fresno and Tulare counties, and also in Los Angeles County. At one time great hopes were entertained that it would become an important crop in California, and from 1909 to 1913 a certain quantity was raised, but lately the growers experienced much difficulty in disposing of their crop at a fair price, as the manufacturers claimed that the quality was poor, and therefore its cultivation has practically been discontinued as a commercial crop.

THE BEST COUNTIES FOR CERTAIN CROPS.*

The six leading counties in the production of cereals, hay and forage, potatoes, sweet potatoes, beans, peas, and other vegetables, and sugar beets are as follows, and this list may be taken to show the districts in which experience has proved that they are best suited. The acreage is that given in the last census.

Barley.

County	Acreage	County	Acreage
San Joaquin	125.114	Colusa	89,985
Monterey	98,923	Merced	88,145
Madera	90,341	Stanislaus	57,529

Corn.

Los Angeles	9,084	Tulare	2,527
San Diego	4,554	San Joaquin	2,547
Orange	3,054	Ventura	2,409

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*For the rank in the principal crops by states see page 93–105.

Oats.

County	Acreage	County	Acreage
Stanislaus	38,546	San Mateo	16,125
San Joaquin	23,208	Madera	10.569
Merced	19,843	Santa Barbara	9,494

Rye.

Merced	2.108	Lassen	526
San Joaquin	1,843	Modoc	406
Plumas	704	Siskiyou	306

Wheat.

Tulare	66,567	San Joaquin	24,786
Madera	39,468	Monterey	22,924
San Luis Obispo	33,608	Stanislaus	22,068

Kaffir Corn and Milo Maize.

Tulare	10,987	Kings	3,931
Imperial	9,789	San Joaquin	2,968
Stanislaus	4,448	Kern	2,813

Hay and Forage.

Los Angeles	154,048	Fresno	95,265
San Joaquin	104,916	Contra Costa	88,937
Tulare	91,595	Riverside	88,430

Potatoes.

San Joaquin	9,895	Los Angeles	2,799
Sacramento	5,036	Monterey	2,374
Sonoma	3,260	Alameda	1,854

Sweet Potatoes.

Merced	780	San Joaquin	88
Los Angeles	218	Orange	75
Sacramento	117	Sutter	48

Beans.

Ventura	58,744	San Joaquin	13,954
Santa Barbara	22,355	San Luis Obispo	11,169
Orange	21,186	Sacramento	7,801

Peas.

Ventura	756	Alameda	215
Humboldt	517	San Mateo	186
Stanislaus	415	Monterey	154
San Joaquin	362		

All Other Vegetables.

Los Angeles	13,385	Sacramento	6,367
Alameda	7,459	Santa Clara	4,241
San Joaquin	6,728	Orange	3,785

Sugar Beets.

Ventura	14,333	Orange	10,275
Los Angeles	14,191	Monterey	9,900
Santa Barbara	11,320	Yolo	5,714

Value of Farm Crops by Counties.

The leading counties in the production of various crops according to the last census, classed according to value, are as follows:

Cereals.

(Value of $1,000,000 and upward.)

County	Value	County	Value
San Joaquin	$3,238,000	Solano	$1,292,000
Monterey	1,695,000	Madera	1,220,000
Merced	1,691,000	Yolo	1,032,000
Colusa	1,578,000	Tulare	1,442,000
Stanislaus	1,315,000		

Hay and Forage.

(Value of $1,000,000 and upward.)

Los Angeles	$3,430,000	Stanislaus	$1,424,000
San Joaquin	1,763,000	Tulare	1,362,000
Fresno	1,702,000	Merced	1,355,000
Riverside	1,624,000	Kings	1,171,000
Contra Costa	1,617,000	Sonoma	1,170,000
Santa Clara	1,587,000	Monterey	1,125,000
Alameda	1,547,000	San Diego	1,110,000

Vegetables.

County	Value
San Joaquin	$2,149,000
Los Angeles	1,255,000
Contra Costa	1,125,000

SUGAR BEETS.*

All the coast valleys of California are favorably situated, in respect to temperature, for the production of sugar beets, and the same may be said of certain lands in other parts of the state. In California there is a larger acreage that is well adapted to the growing of sugar beets than is found in any other state in the Union.

California Sugar Crops, 1899 and 1909.

(From the Reports of the Census.)

Product	Number of farms	Acres	Production		
			Amount	Unit	Value
Sugar beets—					
1899	863	41,242	356,535	tons	$1,550,346
1909†	1,113	78,957	845,191	tons	4,320,532
Sorghum cane—					
Total cane, 1899	----------	----------	----------	----------	3,788
In 1899 cane grown	54	140	1,085	tons	----------
In 1899 cane sold as such	----------	----------	6	tons	10
In 1899 syrup made	----------	----------	8,671	gallons	3,778
Total cane, 1909	----------	----------	----------	----------	14,826
In 1909 cane grown	48	647	3,021	tons	----------
In 1909 syrup made	8	----------	4,330	gallons	2,340

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*For further details regarding beet sugar, see Report for 1913, pages 73–77.

†Includes beets and cane used as forage.

The cultivation of the beet greatly improves the land. According to a Leipzig University professor, the following was the average increase in ten years on one estate:

	Yield before beet culture (bushels) per acre	Yield after beet culture (bushels) per acre	Per cent increase because of beet culture
Wheat	24.5	41.3	68.6
Rye	28.4	40.8	43.7
Oats	61.8	75.3	21.8
Barley	23.2	43.5	87.5
Potatoes	218.6	238.0	8.97
Rape	23.2	48.8	110.0

The following table gives a complete list of beet sugar plants in California, with their names and the location of factories. It also shows the daily slicing capacity, expressed in tons of beets, for each factory.

Beet Sugar Companies and Factories of California in 1915.

Manufacturing companies in California	Factory location	Daily slicing capacity, tons of beets
Alameda Sugar Company	Alvarado, Alameda County	800
Los Alamitos Sugar Company	Los Alamitos, Orange County	700
Spreckels Sugar Company	Spreckels, Monterey County	4,000
Union Sugar Company	Betteravia, Santa Barbara Co.	600
American Beet Sugar Company	Chino, San Bernardino County	1.200
American Beet Sugar Company	Oxnard, Ventura County	3,000
Pingree Sugar Company	Corcoran, Kings County	600
Sacramento Valley Sugar Company	Hamilton City, Glenn County	700
Holly Sugar Company	Huntington Beach, Orange Co.	750
Anaheim Sugar Company	Anaheim, Orange County	600
Santa Ana Sugar Company	Santa Ana, Orange County	600
San Joaquin Valley Sugar Co.	Visalia, Tulare County	500
Southern California Sugar Co.	Santa Ana, Orange County	400
Total		14,450

Beet Sugar, 1900-1916.

(Duty on beets, 15 per cent ad valorem; sugar beet seed free.)

Year	California production, pounds	Imported raw beet sugar	
		Pounds	Value
1900	60,638,000	701,539,452	$14,800,609
1901	137,400,000	908,683,078	20,028,575
1902	147,535,000	255,030,219	4,202,044
1903	131,080,000	87,130,805	1,223,023
1904	118,394,000	2,414,454	50,525
1905	122,500,000	223,944,976	4,797,278
1906	178,000,000	48,548,919	1,032,040
1907	154,800,000	397,745,046	8,203,309
1908	195,000,000	221,036,900	5,401,378
1909	245,000,000	98,625,908	2,521,798
1910	289,493,000	1,148	43
1911	325,076,000	24,669,287	593,037
1912	317,363,000	6,504,260	239,484
1913	342,416,000	182,647,582	4,169,523
1914	338,135,600	2,367,708	70,829
1915	390,686,000	877,623	29,386
1916	549,078,000	2,050	174

Sugar Beets and Beet Sugar Produced in California, 1906-1916.

Year	Number of factories in operation	Sugar beets			Sugar made (chiefly refined)	
		Area harvested, acres	Beets used for sugar, short tons	Average per acre, short tons	Short tons	Pounds
1906	8	60,141	671,571	11.17	92,740	185,480,000
1907	8	47,387	484,816	10.23	73,023	146,045,500
1908	8	62,302	647,085	10.39	89,890	179,780,000
1909	10	83,000	882,084	10.63	127,272	254,544,000
1910	8	90,500	923,100	10.20	139,890	279,780,000
1911	10	99,545	1,037,283	10.42	161,300	322,600,000
1912	11	111,416	1,004,328	9.01	158,904	317,808,000
1913	12	127,610	1,138,003	8.92	171,208	342,416,000
1914	10	104,000	1,082,000	10.4	169,004	338,008,000
1915	11	122,737	1,249,111	10.2	195,343	390,686,000
1916	11	144,803	1,125,595	----------	274,539	549,078,000

The quantity of beet sugar produced in the state in 1916 was the largest in the history of the industry. The amount of beet sugar produced in the United States during the last five years shows a steady increase until 1916, when bad weather reduced the expected yield.

Beet Sugar Production in United States, 1911-1916.

Year	Number of factories	Acreage	Beets used, short tons	Sugar made, short tons
1911	66	473,877	5,062,333	599,500
1912	73	555,300	5,224,377	692,556
1913	71	580,006	5,659,462	733,401
1914	60	483,400	5,288,500	722,054
1915	67	624,000	6,462,000	874,220
1916	74	665,308	5,919,673	820,657

Payment for sugar beets is made to the growers according to the weight of the beets without tops. An estimated amount of tare on account of dirt, improperly topped beets, etc., is deducted from the gross weight of the topped beets as delivered by growers. For the past four years the value of the beet crop to growers has ranged from $30,000,000 to $33,000,000 a year.

Some time elapses between the delivery of the beets and their use in the factory. The harvesting season may close from six to eight weeks earlier than the end of the sugar-making season. During this period beets lose in weight by drying, which causes some loss to the growers.

Sorghum Syrup, 1860-1910.

Sorghum was first introduced into the United States in 1853. Tennessee, Missouri and Kentucky are the largest producers. The following table shows the production in California from 1860 to 1910:

Year	Gallons
1860	552
1870	333
1880	2,459
1890	1,670
1900	8,671
1910	4,330

HOPS.*

The leading states in the production of hops are California, Oregon, Washington and New York.

The total area devoted to the production of hops in California in 1909 was 8,391 acres, producing about 11,994,953 pounds of hops, valued at $1,731,110. The climatic conditions and soil of California are more perfectly adapted to this crop than any other state in the Union, and its average production per acre is greater. The average production per acre in other hop-producing countries of the world has been estimated as follows: England, 905 pounds; Germany, 510 pounds; in the United States, 885 pounds, and in California, 1,469 pounds.

The cultivation of hops in California has increased rapidly, as shown by the following figures, but owing to the low prices several hundred acres were abandoned in 1915, with a possibly larger quantity to be plowed up after the coming crop, provided that hops sell at present cost of production prices. The prices for 1916 opened at 12 cents to 15 cents, but few growers secured these figures, and prices fell to 5 cents to 8 cents, or less than cost of production. The crop the coming season (1917) is estimated at 85,000 or 90,000 bales of 185 pounds each. Because of adverse legislation and very low prices the hop growers are plowing out a good percentage of their hops and planting the land to more profitable crops.

The leading counties in the production of hops in 1916 were:

	Bales
Sacramento	72,000
Sonoma	30,000
Mendocino	16,000
	118,000

California Hop Crop, 1860-1910.
(From the Bureau of the Census.)

Year	Acres	Pounds
1860		80
1870		625,064
1880	1,119	1,444,077
1890	3,974	6,547,338
1900	6,890	10,124,660
1910	8,391	11,994,953

NOTE.—The acreage was not reported prior to 1880.

The highest and lowest prices per pound paid to growers during the last nine years have been as follows:

Year	Highest, cents	Lowest, cents
1908	14	7
1909	25	12
1910	30	15
1911	45	25
1912	22	13
1913	26	13
1914	18	5
1915	14	7
1916	12	5

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*For further details regarding hops, see Report for 1913, pages 77–79.

California Hops, Imports and Exports, 1901-1916.
(Duty, 16 cents per pound.)

Year	California crop		Exports		Imports	
	Bales*	Pounds	Pounds	Value	Pounds	Value
1901	48,000	9,360,000	14,963,676	2,466,515	2,606,708	851,008
1902	53,000	10,176,000	10,715,151	1,550,657	2,805,293	833,702
1903	56,000	10,752,000	7,794,705	1,909,951	6,012,510	1,808,491
1904	63,000	12,222,000	10,985,988	2,116,180	21,758,163	1,374,327
1905	67,500	13,095,000	14,858,612	4,480,666	4,339,379	1,980,804
1906	80,000	15,520,000	13,026,904	3,125,843	10,113,989	2,326,982
1907	82,000	16,072,000	16,809,534	3,531,972	6,211,983	1,974,900
1908	68,000	13,260,000	22,920,480	2,963,167	8,493,265	1,989,261
1909	69,000	12,765,000	10,446,884	1,271,629	7,386,574	1,337,099
1910	71,000	13,135,000	10,589,254	2,062,140	3,200,560	1,499,354
1911	87,000	16,095,000	13,104,774	2,130,972	8,557,531	2,706,600
1912	117,000	21,645,000	12,190,663	4,648,505	2,991,125	2,231,348
1913	118,500	21,922,500	17,591,195	4,764,713	8,494,144	2,852,865
1914	110,000	20,350,000	24,262,896	6,953,529	5,382,025	2,790,516
1915	115,000	21,275,000	16,210,443	3,948,020	11,651,332	2,778,735
1916	118,000	21,830,000	----------	----------	675,704	144,627

*A bale averages from 185 to 190 pounds net, the variation depending upon the quality and the compression of the hops.

CALIFORNIA COTTON.*

The culture of cotton in California has become of commercial importance within the past few years. Of the two counties now producing cotton, Imperial County had in 1916 an estimated acreage of 55,000 acres planted in the Imperial Valley, and 200 acres in the vicinity of Bard in the San Pasqual Valley, under the Yuma Irrigation Project; Riverside County has about 6,000 acres of cotton in the Palo Verde Valley. In all these localities cotton is grown under irrigation, by far the most extensive irrigation cotton agriculture in the United States.

Paying prices for cotton have prevailed except during the season of 1914–15, when short-staple cotton sold at from 6 cents to 8 cents per pound. In other seasons from 10 cents to 14 cents per pound has been realized for short-staple cotton. As the yields from properly grown cotton in the Imperial Valley are a bale per acre, sometimes more, the income from cotton growing makes it a profitable business.

Short-staple cotton, the crop grown generally throughout the South, is planted to about two-thirds of the present acreage in the Imperial Valley. In 1912 Durango cotton, a long-staple American upland cotton similar to that grown in the Yazoo delta of Mississippi, was introduced to the Imperial Valley by the United States Department of Agriculture. This cotton has fiber from $1\frac{3}{16}$ inches to $1\frac{1}{4}$ inches in length and sells at from 2 cents to 5 cents per pound premium over the short-staple cotton. As it produces as well as the short-staple cotton and can be grown for a fraction of a cent more per pound it has commanded increased favor annually. The acreage to Durango cotton has been extended from 200 acres in 1912 to more than 15,000 acres in California last season.

Egyptian cotton is grown successfully in the Imperial Valley, and owing to the very high prices paid for it in Arizona during 1916, from one to three thousand acres will be planted the coming season at Bard.

Short-staple cotton is grown in the Palo Verde Valley, Riverside County. Yields in that valley are equally as good as those in the Imperial Valley.

This last season, cotton has been the best paying crop in Imperial Valley. The farmers are so encouraged that the acreage this coming season will be greatly increased, and there is no doubt but what cotton is now the most staple crop in that section of our state.

In the south, the production per acre has been greatly reduced since the commencement of the European war, due to lack of fertilizing agents. Imperial Valley has not suffered at all in this respect, as the land is automatically fertilized every time they irrigate with the water from the Colorado River. This fact alone has greatly assisted the farmers in that district. The yield per acre in Imperial Valley is much larger than in any other state in the Union. In 1916 the average was 400 bales per acre, the next highest being Virginia with 310 bales, and Alabama the lowest with 79 bales.

In 1915 about one-fifth of the crop was Durango long staple, the balance short staple. Bales averages 500 pounds. The average price received for the short staple cotton was 11 to 12 cents; for the Durango cotton 16 to 18 cents per pound The quality of the cotton was superior to that of the 1914 season, owing to the fact that most of the 1915 crop was grown from seed, while the 1914 crop was largely grown from old stumps (Ratoon cotton) of the previous season's planting. The price was from 5 to 6 cents per pound better in 1915-1916 than in 1914-1915.

Durango cotton has had consistent supporters in the Imperial Valley since 1911, and the acreage since 1913 has had a gradual increase. Owing to peculiar local conditions, the fact that short staple cotton has always been grown on more extensive acreages than the Durango is not a clear indication of the relative popularity of the Durango cotton. Properly grown Durango cotton yields as well in the Imperial Valley as does similarly grown short staple. The expense of production is a fraction of a cent more per pound than for short staple, so that in a market paying from 2 to 6 cents per pound more for the Durango cotton, the long staple cotton is by far the more profitable.

For 1917 the crop in Imperial Valley will probably amount to between 60,000 and 70,000 bales, while Palo Verde Valley will probably raise 6,000 to 8,000 bales. The total value of the crop with its by-products will probably amount to approximately $12,000,000.

The increase in the value over last year is largely due to the increased value of the staple, the average price received this season being between 18 and 25 cents per pound, depending on the staple of the cotton. A large proportion of the long staple or Durango cotton was grown in the valley this year, and a very good premium was received for it on account of the fact that there was a shortage of long staple cotton this year, largely caused by the increased demand for long staple cotton in connection with the manufacture of tire fabric and high grade mechanical goods for export in connection with the European war; also on account of the difficulty in getting European cotton to this country on account of the shortage in shipping and the high war risk rates.

The large premium which has been paid for long staple cotton this year will undoubtedly influence many to plant long fibre cotton this coming season in the valley. Farmers, however, should bear in mind the fact that it is more expensive to grow long staple than short and if abnormal conditions do not exist next year they will not receive so great a premium. Indications are that about 120,000 acres will be planted this coming season to cotton in Imperial and Palo Verde valleys and under favorable conditions a crop of over 100,000 bales should be produced.

While the California cotton mills consumed from 8,000 to 10,000 bales of Imperial Valley cotton this season, a large portion of the valley's cotton was shipped to eastern mills, Japan being a very conservative buyer in the valley this season.

The yield in bales for the cotton crop for 1916 has been about 55,000 from an acreage of around 90,000. The grade has been about the same as last year, but the price has ranged at a much higher level. Both cottons, the short variety and the Durango, sold from 5 to 9 cents per pound over last season; the range in price on short being from 11 cents to 20½ cents, and on Durango from 18 cents to 28 cents per pound. The Durango sold for more, above the short staple, this past season, than it has heretofore, the reason being that the cotton is becoming better known to the general trade.

Estimated Cotton Crop of the Imperial Valley, 1909-1916.
(In bales of 500 pounds.)

Year	Acres	Bales		Average price per lb.		Value of cotton	Value of cotton and seed
		Short staple	Durango or Long staple*	Short staple	Long staple		
1909	324	350		14		$12,810	
1910	9,000	5,986		14		419,000	
1911	12,000	9,790		10		489,500	$549,500
1912	9,000	8,215		12	17	492,900	552,900
1913	20,000	19,000	1,000	13	16	1,315,000	1,495,000
1914	60,000	40,000	5,000	7	12.5	1,700,000	2,075,000
1915	40,000	21,000	6,000	12	16.5	1,755,000	2,205,000
1916*	90,000	35,000	20,000	20	26	6,100,000	7,300,000

*Estimated.

The figures include the cotton produced on the Mexican side of the border, which is largely operated by the residents of Imperial County, and is ginned and marketed there.

SILK.

The production of silk in California is named in the Census of 1870, when 3,587 pounds of silk cocoons were reported. In 1880 a state silk culture association was organized but later became dormant until revived in 1908 as the Ladies' Silk Culture Society of California. The society has established a farm at Rutherford, Napa County, where they have nearly 800 white and red mulberry trees, and distribute cuttings free to all parts of the state. A ten thousand dollar building has been constructed for hatching worms, and other purposes.

Silkworm eggs have been secured from France and Italy, and in the course of time it is hoped that the work will develop into an important industry. At the San Francisco Land Show in October, 1913, a gold medal and the blue ribbon were awarded for raw silk produced at the Rutherford farm.

The only silk mill manufacturing silk thread west of Michigan is at Petaluma, Sonoma County, which has a monthly capacity of an average of 5,000 pounds of gum silk and about an equal amount of finished silk. This would be 60,000 pounds a year.

In Petaluma they start with the raw silk as wound from the cocoon; the winding of raw silk from the cocoon is done exclusively in China and Japan. This raw silk so wound into skeins is continued through the process to the gum state, which is its condition when it comes off the machinery prior to dyeing to the several shades necessary for the range of colors which are produced.

The production consists of spool silks for domestic use for dry goods stores, sewing silk for manufacturing purposes such as making of boots, shoes, clothing, hats, gloves and so on; also embroidery silks for all purposes and knitting silk for the manufacturing of garments, hats, caps; tram silk for the covering of cords, braids, and the manufacturing of surgical goods—in fact, all kinds of silk threads for whatsoever use.

RICE.

If its importance as a food product is to be measured by the number of persons who consume it, rice must, without a doubt, be considered the greatest cereal, as it is more widely and generally used as a food material than any other. Half a century ago experiments were made in the cultivation of rice in California, but they were not successful. In 1860, small quantities were raised in Alameda, Tehama, San Mateo, Santa Cruz and Sonoma counties, but the total amount produced was only 2,140 pounds.

The successful introduction of this crop is dependent upon an abundant supply of water, which must always be available during the growing season. The soil area adapted to rice in this valley is sufficiently large to produce many times the 55,000,000 pounds of cleaned rice which are consumed each year on the Pacific coast. How much of this area has sufficient available water for proper irrigation is uncertain, though for a good portion of it there is apparently an abundant supply. Increase in the rice acreage should therefore be made with care.*

Its culture has opened up a new industry for lands which have hitherto been deemed unfit for anything but wheat, on account of the adobe conditions of the soil. The time of harvest varies, according to the variety, from August to November.

In 1913 there were 6,200 acres of rice in California, all but about 150 acres in the Sacramento Valley. The results obtained were very good, the yield ranging from 2,500 to 5,000 pounds per acre, averaging about 3,200. About 1,000 acres were late and could not be threshed before the rains started in the fall.

Rice is grown successfully in the northern part of Kern County, on heavily laden alkali land which had hitherto been regarded as practically worthless. From 15 acres 349 sacks, weighing from 100 to 110 pounds, were produced, valued at 3 cents per pound.

In 1914 there were 16,000 acres in rice, compared with 6,200 the previous year. The average yield was about 2,800 pounds per acre, the total crop amounting to about 44,800,000 pounds, the quality being good and the average price about 2 cents per pound to the grower. About 1,750 acres were not harvested. Low yields and failures in some cases were due principally to late seeding and watering and damage caused by barnyard grass.

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*Report on Rice Growing, Circular No. 97, U. S. Department of Agriculture.

The following is the acreage of rice by counties in 1915 and 1916:

Sacramento Valley	Acres	San Joaquin Valley	Acres
Butte County	15,200	San Joaquin County	150
Glenn County	500	Stanislaus County	200
Colusa County	8,750	Merced County	45
Yolo County	1,500	Fresno County	1,120
Yuba County	1,990	Tulare County	400
Shasta County	5	Kings County	300
Sutter County	850	Kern County	900
Solano County	180	Imperial County	10
		Ventura County	10
Total	28,975	Total	3,135
Total acreage in the state			32,110

Rice Acreage by Counties, 1916.

Sacramento Valley	Acres	San Joaquin Valley	Acres
Butte	21,000	San Joaquin	100
Colusa	16,100	Fresno	280
Yolo	12,600	Kern	1,110
Glenn	8,100	Tulare	490
Yuba	1,200	Kings	410
Sutter	2,600	Stanislaus	810
Solano	200		
		Total	65,000

Average yield per acre, 2,400 pounds; maximum, 5,000; minimum, 1,750 pounds. Price, average approximately, $1.90 per hundred to growers.

There were six rice mills in the state in 1914 with a daily capacity of approximately 5,000 bags (100 pounds each) per day.

The mills handle the complete process from the time the rice leaves the threshing machine on the field until it is packed in 2½-pound cotton bags ready for retail consumption, both in the polished and unpolished. The by-products, such as bran and rice meal, are very nutritious for cattle and hog feed.

The growers received from $2.20 to $1.90 f.o.b. cars shipping point for the 1914 crop, per bag of 100 pounds. The total production of rice in the state in 1915 was approximately 888,000 sacks of 100 pounds each. The quality was good, and the price ranged from $1.70 to $2.00 per hundred, averaging about $1.85.

The 1916 crop amounted to about 1,200,000 bags of rough rice, which did not compare, so far as quality is concerned, with the previous crop, it being more starchy, and not giving the yield of the year previous, owing to weather conditions, and not being thoroughly dried.

As regards the price, this year's prices have averaged higher than last year, paddy being sold from $1.60 early in the season to $3.25 at the present time, while the last year it did not go higher than $1.65 to $2.00.

Prices on the 1916 crop were quite low—lower than they were the year before by perhaps three-eighths of a cent—up until the rise that commenced about the first of March, since which time prices have advanced by leaps and bounds until today the price is nearly double what it was two months ago.

At the present time the paddy has all been sold by the farmers and mills have practically all shut down, and there are only about from 40,000 to 50,000 bags of paddy scattered over the state, yet to mill.

With regard to the quality of rice this year compared with last year: There was a great deal of immature rice this year, much of this on account of the poor quality of seed sown by the farmer. The farmers in California have not yet arrived at the time of appreciation of the absolute necessity of using good seed.

The outlook for 1917 is unusually bright and there will probably be in the neighborhood of 110,000 acres planted to rice this year. The growers are already getting their seed planted earlier than last year and the outlook is unusually good.

TOBACCO.*

For several years extensive and exhaustive experiments in the production of tobacco from Turkish seed were carried on at the Exeter Tobacco Ranch in Tulare County. There have been a number of types of tobacco experimented with, but the types that have been attended with the greatest success are such as are suitable for cigarette manufacture. The tobacco raised during recent years has been produced about equally by Fresno and Tulare counties, the total quantity being 7,500 pounds in 1909; 15,000 in 1910; 45,000 in 1911, and 150,000 in 1912. The 1912 crop sold at from 30 cents to 60 cents per pound; most of it average 47½ cents. Some tobacco is also grown in Los Angeles County and the southern part of the state.

In 1913 the crop of leaf tobacco amounted to about 175,000 pounds, some of which it is stated was purchased by the Eastern market. According to a leading authority, the crop was not as good as in former years, owing to the farmers planting too large an acreage and not being familiar with the culture of tobacco. The growers in Fresno County, where a considerable quantity has been produced, have experienced much difficulty in disposing of their crop at a fair price, so the cultivation of tobacco has declined.

VEGETABLES.

The potato is the most important vegetable raised; the acreage in 1912 was 78,000, and the production 10,140,000 bushels, valued at $6,591,000, an average of 130 bushels to the acre.

Next to the Irish potato, the sweet potato is the most extensively grown vegetable in the United States. In California it is not cultivated on a large scale. In 1909, the acreage amounted to 5,111, with a production of 572,814 bushels. In 1915, the acreage was 6,000, yielding 135 bushels to the acre, the total production being 810,000 bushels.

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*For the early experiments in growing tobacco in California, see the Report for 1913, page 82.

Beans and Peas Produced, 1850-1910.†
(From the Bureau of the Census.)

Year	Beans, bushels	Peas, bushels
1850	2,292	-----------
1860	165,574	-----------
1870	380,010	-----------
1880	378,971	40,806
1890	713,480	32,364
1900	658,515	57,299
1910	3,323,608	57,468

†Beans and peas were reported as one product in 1850, 1860, and 1870.

The acreage in beans in 1910 was 157,825, producing beans of the value of $6,292,955; the acreage in dry peas was 2,959, valued at $101,016.

Beans Now an Important Crop.

Lima beans are only grown in any quantity in five counties, and have come into great favor in recent years. They were first cultivated in Carpinteria Valley about forty years ago, and after 1884 the growing extended. The bulk of the crop is raised in Ventura County; Orange, Santa Barbara, Los Angeles and San Diego counties being next in order. San Diego County, however, is increasing its acreage in lima beans very fast. Some of the best sections yield 40 to 45 sacks per acre. The average yield is 14 sacks of 80 pounds, or 1,120 pounds to the acre, but in the best sections 35 or even 40 sacks of 80 pounds to the acre have been raised.

In Ventura County the yield is not less than twenty 80-pound sacks to the acre, whereas 12 sacks is considered a good yield in Orange County. The commercial production of dried lima beans is practically confined to the southern coast district of California, very few being produced in other states. In October, owing to wet or damp weather, considerable damage was done in the southern districts to small white beans and lima beans, but the loss was more than made up in price, as the market at the beginning of the season ranged from $4.25 to $15.50 per 100 pounds later.

Beans are packed in sacks of varying weights, depending upon the varieties. Blackeyes are lighter than some others and are generally packed in sacks of from 80 to 85 pounds; pinks in sacks of 80 or 90 pounds; white beans in sacks of 90 or 100 pounds.

During the past few years limas have been packed in sacks of 100 pounds, though some still are packed in 90 pound sacks.

The other varieties of beans are grown mostly in the delta region of the Sacramento and San Joaquin rivers. The pink variety is grown generally in all the bean sections of California; the large white or Lady Washington in the Sacramento and San Joaquin river sections; the Blackeye is in reality a cowpea and is grown all over the state, but principally in the southern counties of Ventura, Riverside, Los Angeles, Orange, and San Diego; and they are also grown in the San Joaquin Valley. The Bayo is not grown extensively, and is produced in a limited area of the choicest river bottom lands in the Sacramento and San Joaquin valley sections; the small white, or navy bean, is a late variety and grown mostly in the coastal counties of Monterey, San

Luis Obispo and Santa Barbara. Large quantities are shipped to Boston, where they are prepared as "Boston baked beans."

Castor beans were first grown in California over forty years ago, without profit, and have never been profitable since that time. They are not edible, either by man or stock, their only use being for making oil.

North Carolina and Tennessee are the two leading states in the production of soy beans, but they are not yet grown in California. Soy beans, introduced into the United States more than a hundred years ago, primarily for use as a forage crop, are in reality one of the most nutritious of the legumes when used as human food, according to specialists of the United States Department of Agriculture. These beans have been used for centuries as a staple article of diet in China and Japan and are coming to be used more generally in this country as consumers learn their food value and palatability. Since they furnish protein, which contains nitrogen for muscle building, and valuable fat, they are especially important to turn to as an emergency addition to the usual dietary or as substitutes for other foods furnishing protein and fat. Moreover, the fact that they contain no starch makes them valuable for invalids who can not eat starchy foods. These beans may be grown easily in practically all sections of the country where corn is grown and give heavier yields than most other beans.

Soy beans have been so important for other purposes that until recently they have attracted little attention for food purposes in this country. They are now coming into their own for that purpose, however, and the acreage of soy beans has increased steadily in recent years. The dried beans may be purchased now in a number of markets in various parts of the country, often under the name of togo beans.

Where dried soy beans are available they may be baked with or without pork, like navy and other beans. They should be soaked over night and should be cooked longer than other kinds of beans. The cooking may be done economically in a fireless cooker of the sort provided with heating stones or plates; or on the ledge of the fire box inside the furnace if the house happens to be heated with one of this type.

Dried soy beans have been canned in considerable quantities during the past season, baked with pork, and are on sale in this form in numerous markets. Canned green soy beans, which may be compared with lima beans, also are on the market in some sections of the country. Both these canned products yield as high a proportion of energy and a higher proportion of protein than the canned beans with which they are most closely comparable, and so are more nourishing. Both are produced and handled usually at a lower cost than other beans and should, therefore, be obtainable at lower prices. They are not generally used as a human food in this country, although perfectly edible. Velvet beans are at present confined to a few of the Gulf States, and is the leading legume in Florida.

The amount of soy bean oil imported was as follows:

	Pounds
1914	1,929,435
1915	3,837,865
1916	98,119,695

The quantity of beans imported in 1915 was 3,837,865 pounds.

Beans have become one of the most important vegetable crops in the state.

Owing to wet weather considerable damage was done to small white and lima beans. The market prices were the highest on record, ranging from $4.25 at the beginning of the season to $15.50 per hundred pounds. The average price on the entire crop was about $7.50 to the grower, recleaned.

California Beans, 1911-1916.

(Sacks.)

Variety	1911	1912	1913	1914	1915	1916
Limas*	1,300,000	1,200,000	1,050,000	1,500,000	1,800,000	1,750,000
Blackeyes	225,000	204,000	80,000	150,000	405,000	150,000
Large whites	75,000	63,000	115,000	100,000	155,000	350,000
Small whites	215,000	215,000	40,000	325,000	600,000	550,000
Bayos	150,000	65,000	60,000	75,000	85,000	125,000
Pinks	710,000	298,000	250,000	500,000	650,000	850,000
Various	150,000	118,000	120,000	125,000	98,000	250,000
Totals	2,825,000	2,163,000	1,715,000	2,775,000	3,793,000	4,025,000

*On the basis of bags of 80 pounds, although bags of 100 pounds are increasing every year.

Imports and Exports of Beans, 1906-1916.

(Duty—beans, 25 cents per bushel of 60 pounds; dried peas, 10 cents per bushel; split peas, 20 cents per bushel)

Year	Exported†		Imported	
	Bushels	Value	Bushels	Value
1906	447,474	960,710	458,041	667,214
1907	435,490	932,264	406,679	656,898
1908	306,939	708,201	1,657,401	2,406,935
1909	298,209	702,819	3,355,405	4,926,199
1910	365,721	973,231	1,015,157	1,621,207
1911	288,638	814,663	1,037,371	1,733,697
1912	341,268	1,011,466	1,004,930	1,857,220
1913	400,868	1,080,066	1,048,297	1,938,105
1914	314,655	875,493	1,634,070	2,955,663
1915	1,214,281	3,638,526	905,647	1,461,917
1916	1,760,383	5,914,198	662,759	1,288,034

*For the production of dried beans and peas by counties, see page 116.
†In the exports dried peas are included in the total with beans.

Tomatoes.

The production of tomatoes has increased so much in recent years that it has become an important crop. The season is from about June 15 to October 1, and during that period in 1914 the California shipments amounted to 498 cars, the ten places with the largest number of cars being: Decoto, Alameda County, 95; Henderson, 60; Sacramento, 60; Merced, 47; Los Angeles, 45; Marysville, 41; Fullerton, 39; Monte, 23, Sunnyvale, 22; and Anaheim, 11.

Celery.

Celery is an important crop and was formerly grown on a large scale in Orange County, but owing to the blight it has ceased to be a commercial crop in this county, the growers turning to lima beans and sugar beets, which are more certain and less expensive to raise. A large quantity is raised near El Monte, in Los Angeles County, and also a large acreage near Stockton, in San Joaquin County, and also in Contra Costa and Sacramento counties. The 1915 price per dozen bunches was almost double that of 1914, owing to the fact that the Eastern crop was almost an entire failure, the excessive rains causing blight. In 1916 a freeze in the early part of the winter damaged the crop in the north, but in Orange and Los Angeles counties the quality was much better than in 1915. The price per dozen bunches of celery received by the grower was at least 25 per cent more than the price received in 1915.

Onions.

The onion crop the last two years has not changed much. San Joaquin, Contra Costa and Santa Barbara counties are the leading producers of onions. The total acreage and production the last two years has been as follows:

Year	Acreage	Yield per acre, bushels	Total production, bushels
1914	9,924	400	3,969,600
1915	8,128	375	3,048,000

In 1916 the acreage in Bermuda onions was estimated at 635 acres in Imperial County and 800 acres in Riverside County. The number of cars shipped out of these two counties was 326.

The bulk of these crops of celery and onions are raised in San Joaquin and Sacramento counties. Cucumbers are mostly grown near Hayward and Niles, in Alameda County, and cabbage near Montebello, in Los Angeles County.

According to the figures of the California Vegetable Union, Los Angeles County leads in the production of cauliflower, cabbage, lettuce, tomatoes and mixed vegetables; San Joaquin in potatoes and onions; San Mateo in artichokes, and Sacramento in asparagus, where about 80 per cent of the crop is produced, the principal districts being Grand, Tyler, Twitchell, Sherman and Sutter islands and Walnut Grove.

The annual average shipments are approximately as follows:

Vegetables	Number of cars	Average price paid to growers
Artichokes	150	25 cents to $1.00 per dozen.
Asparagus	350	3 cents to 4 cents per pound.
Celery	2,500	15 cents to 40 cents per dozen.
Cauliflower	800	15 cents to 60 cents per dozen.
Cabbage	1,000	$8.00 to $40.00 per ton.
Potatoes	10,000	50 cents to $2.00 per cwt.
Lettuce	300	8 cents to 25 cents per dozen.
Tomatoes	300	$15.00 to $30.00 per ton.
Onions	2,000	50 cents to $2.00 per cwt.
Mixed vegetables	1,000	

Commercial Acreage of Garlic.

It is estimated that the commercial acreage of garlic in the states named below in 1917 is about 1,545 acres, as compared with 2,065 acres in 1916, a decrease of 520 acres, or about 25 per cent. Detailed estimates follow:

State	1917 (acres)	1916 (acres)
Louisiana	725	1,160
Arkansas	50	100
Texas	680	540
California	110	125
Totals	1,565	1,925

California.—Imperial, Los Angeles, Riverside, San Joaquin, San Mateo, Santa Cruz, and Santa Clara.

The imports of garlic into the United States during the fiscal year beginning July 1, 1915, and ending June 30, 1916, were 9,471,619 pounds.

Mustard Seed.

The crop of mustard seed harvested in 1916 amounted to about 29,819 pounds, about 5,000 being yellow and the balance Trieste, or red seed. The quality was quite as good as in 1915, and the yellow was even better and plumper seed on account of being raised on bean land. Prices were exceptionally high, none being imported. Yellow seed sold as high as 11 cents to the grower, and red 10 cents. The entire crop was practically sold.

CANNED VEGETABLES.

California ranks first among the states in the production of canned asparagus, and sixth in that of canned tomatoes. The case which is used as the unit of measure consists of 24 standard-size cans No. 2 (also called 2-pound cans) for beans, peas, and No. 3 (also called 3-pound cans) for all other vegetables. Where the output has been reported in other forms by the canneries, the quantities have been reduced to standard cases.

The principal counties producing tomatoes are Los Angeles, Orange, Alameda, Santa Clara and Sonoma. There is also a considerable acreage in certain portions of the San Joaquin and Sacramento valleys. The average yield of tomatoes grown for the canneries varies from 8 to 10 tons. Under favorable conditions yields of from 15 to 20 tons, and occasionally of 25 tons per acre, are realized. The prices paid by the canneries vary from $6 to $8 per ton, while the prices paid in the fresh markets vary from $10 to $40 per ton.

The value of the vegetables canned increased throughout during the decade of 1899–1909, the rate of increase from 1904 to 1909 being much higher than that during the preceding five-year period. The value of canned asparagus formed over half of the value of all canned vegetables in 1909.

Canned Vegetables, 1899-1909.

(Compiled from the reports of the Bureau of the Census.)

Product	1899		1904		1909	
	Cases	Value	Cases	Value	Cases	Value
Asparagus					198,123	$1,794,346
Beans	34,209	$56,797	65,641	$133,494	47,525	87,059
Peas	72,760	145,987	68,142	144,033	123,349	250,624
Pumpkins	1,033	1,860	18,852	30,156	11,694	15,165
Tomatoes	794,566	2,068,997	541,776	845,805	545,131	1,120,632
All other	148	396	286,172	1,213,173	65,812	202,795
Totals		$2,274,037		$2,366,661		$3,470,621

Duty on Imported Preserved Vegetables.

All kinds 25 per cent ad valorem.

Canned Vegetables, 1901-1916.

Year	California pack, cases	Exported Value	Year	California pack, cases	Exported Value
1901	1,076,058	$528,914	1909	1,242,720	$728,111
1902	1,151,268	560,612	1910	2,250,645	782,973
1903	1,343,574	597,759	1911	2,293,000	1,061,259
1904	961,783	719,580	1912	2,789,495	1,822,357
1905	1,192,455	580,048	1913	2,192,330	1,819,281
1906	1,747,595	658,739	1914	3,028,255	1,520,879
1907	1,941,755	598,628	1915	2,608,214	1,898,840
1908	1,501,885	621,987	1916	4,225,070	2,529,694

California Vegetable Pack by Varieties, 1912-1916.*

(Cases.)

	1912	1913	1914	1915	1916
Tomatoes	1,621,100	1,146,560	1,893,650	1,344,085	2,647,300
Peas	269,425	93,870	162,095	209,399	227,120
Asparagus	719,200	723,000	768,810	809,860	990,740
Beans and other vegetables	179,770	228,900	203,700	243,870	359,910
Total vegetables	2,789,495	2,192,330	3,028,255	2,608,214	4,225,070

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In 1909 the total acreage of potatoes and other vegetables was 151,962 and their value $12,121,958. Excluding potatoes and sweet potatoes the acreage of vegetables was 79,163 and their value $6,887,000, both being more than twice as great as in 1899. The above table distinguishes between farms which make the raising of vegetables a business of some importance, and others on most of which vegetables are raised mainly for home consumption.

Licorice.

This plant is cultivated throughout the warmer parts of Europe, and to some extent in California and Louisiana, and there is much suitable ground in this state where it might be grown profitably. At present Russia supplies practically the whole world with licorice.

This article a generation ago was known and used mainly for its medicinal properties, but has since found other and wider applications, particularly in the tobacco industry of the United States and Canada, which consumes annually many thousand tons of licorice. The amount of licorice root imported for the year ending December 31, 1914, was 103,224,650 pounds, valued at $1,871,863. In addition to this a considerable quantity is imported in the form of extracts and paste. Owing to the war the quantity has fallen off considerably during the last two years.

THE CORK INDUSTRY.

The cork of commerce is the bark of an evergreen species of oak (*Quercus suber*) tree, which reaches a height of about thirty feet. It grows in the south of Europe and north African coasts, but principally in Spain and Portugal.

The *Quercus suber* is long-lived and the quality of the bark increases with the age of the tree. Many trees in Portugal are known to be centuries old and their product has been gathered by families through succeeding generations.

There are many cork trees in the San Joaquin Valley, although none of them have been utilized for commercial purposes. Their great value lies in their beauty as shade trees and for ornamental purposes. M. Theo Kearney planted a number of cork oaks on his magnificent estate near Fresno, which passed at the time of his death to the University of California. James Lick, founder of the Lick Observatory, grew cork oaks at his home place in Agnews and there are 200 trees, now five years old, at the George C. Roeding ranch near Fresno.

The cork oak has all the stately beauties of other varieties but has the added advantage of comparatively rapid growth. Cork oak may never be on a commercial basis in California but it grows well here and there is nothing to prevent some man with a deep vision into the future from founding a new industry.

The first stripping of cork from young trees takes place when they are from fifteen to twenty years old, and is known as "virgin cork," which is used only for tanning purposes, or for rustic work in ferneries, conservatories, etc. Subsequently the bark is removed every eight or ten years, the quality of the cork improving with each successive stripping, and the tree lives and thrives under the operation for 150 years and upwards. The produce of the second barking is still so coarse that it is used only for floats for nets, etc.

TAN BARK.

This oak (*Quercus densiflora*) is found in southern Oregon and southward to Mariposa County in California. The tree is also known locally as chestnut oak (*Quercus prinus*). This species grows from southern Maine to Maryland, and in the mountains south to north Alabama and Georgia, and west to Lake Erie, Kentucky and Tennessee.

The amount of oak bark used in 1905 amounted to 422,000 cords, valued at $3,765,000.

Value of Cork Imported Into the United States.

Year	Value
1912	$3,242,319 00
1913	3,152,070 00
1914	3,851,794 00
1915	2,762,895 00
1916	3,134,884 00

The greater part of imported cork comes from Spain and Portugal, each supplying about half of the above quantities; that from other countries is very small.

California Tanbark and Tanning Extract in 1909.

Description	Tons	Cost	Average cost per ton
Oak bark	36,005	$714,146	$19 83
Myrobalan nuts	620	20,470	33 02
All others	495	10,152	20 51
Totals	37,120	$744,768	$20 06

The average cost per ton in 1909, $10.31, was 73 cents more than in 1908. The highest average cost per ton was reported by California, $20.06. In the total quantity of bark, etc., used in 1909, eleven out of the twenty-one states showed gains over 1908, the greatest being 9,605 tons in California. Valonia, which is a product of *Quercus agrilas,* and *Quercus œgilops,* is the commercial name of the acorn cups of these species of oak, which has a higher percentage of tannic acid than any other known tannic material, containing as much as 40 per cent of acid.

GINSENG IN CALIFORNIA.*

Many demands are made for information regarding the cultivation of this plant, many appearing to believe that owing to its high price it must be an exceedingly profitable crop, but it offers little inducement for inexperienced growers looking for quick profits from a small investment. The plant takes eighteen months to germinate, and six years to mature; it requires good soil, shade, and careful cultivation. Last year in the San Francisco market it brought from $4 to $7 per pound, according to grade.

The market rates per pound on December 31, 1913, were $12.50 gold for extra and selected, $11 for good root, and $9.55 for fair root, as compared with $10.10, $9 and $7.87 per pound on December 31, 1912.

The rates for cultivated root during 1913 varied from $2.20 to $11 gold per pound, depending upon quality and condition. A large portion of the American imports were sold as of too poor a quality to be graded in the usual manner. The necessity of preparing root in accordance with Chinese ideas, rather than American ideas of what the Chinese ought to want, must not be forgotten.†

Ginseng is only cultivated in small lots. The total acreage in the United States in 1910 was only 23 acres; the value of the ginseng produced was $151,888.

Exports of Ginseng From the United States, 1908-1915.

Year	Pounds	Value	Year	Pounds	Value
1908	154,180	$1,111,994	1913	221,901	1,665,731
1909	186,257	1,270,632	1914	224,605	1,832,686
1910	192,406	1,439,434	1915	103,184	919,931
1911	153,999	1,088,202	1916	256,082	1,597,508
1912	155,308	$1,119,301			

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*For a full description of the cultivation and prices of ginseng, see Report for 1913, pages 85–86.

†Consular Reports, March, 1914.

Ginseng is shipped to Hongkong, where a syndicate of Chinese merchants control almost the entire ginseng trade of China, receiving the importations and distributing them throughout the country.

The only competitor America has to fear in this line is Japan. If it is desired to place unmatured American ginseng on the market, the roots should be fumigated with sulphur, which permits of their longer preservation without deterioration. American ginseng is usually imported in its original state. The Chinese buyer assorts the roots according to quality. Some are put into cloth sacks and shaken until the skin becomes smooth, and those resembling the human form are boiled in sirup and afterwards fumigated with sulphur. In this way their value is considerably increased.

Vegetables, Flowers and Plants and Nursery Products, 1899-1909.

(Compiled from the reports of the Bureau of the Census.)

Crop	Number of farms	Acres		Value of products	
		1899	1909	1899	1909
Vegetables other than potatoes and sweet potatoes	*33,755	32,401	79,163	$2,858,832	$6,886,885
Farms reporting a product of $500 or over	2,075	--------	53,369	----------	4,836,001
All other farms	31,680	--------	25,794	----------	2,050,884
Flowers and plants, total	442	672	1,013	580,646	1,388,513
Farms reporting a product of $250 or over	347	--------	--------	----------	1,373,577
All other farms	95	--------	--------	----------	14,936
Nursery products, total	566	2,914	4,803	558,329	2,212,788
Farms reporting a product of $250 or over	296	--------	--------	----------	2,134,713
All other farms	270	--------	--------	----------	78,075

*Not including 9,393 farms that had vegetable gardens, but gave no information as to their products.

FLOWERS, PLANTS, AND NURSERY PRODUCTS.

The choice of crops by the florist is largely influenced by changes in popular taste, the camellia, which was the most popular flower years ago, having been superseded in recent years by the rose, carnation, violet, chrysanthemum, and lily of the valley. There is also a growing demand for orchids.

The raising of flowers and plants and of nursery products is also of considerable importance in California, 5,816 acres being devoted to them in 1909, and the output being valued at $3,601,301. Most of the product was raised on farms where these branches of agriculture were carried on as an important business.

In 1909 a total of 96,230,420 square feet, or over 2,200 acres, of land under glass was reported in the United States.

In California, 430 farms were reported as florists' establishments, with 1,572,480 square feet under glass.

There is comparatively little land under glass in California, compared with the Eastern States, as the climate does not require it.

FLOWER AND VEGETABLE SEEDS IN 1916.

The growing of seeds has become an important industry in the state, the area in 1916 being upwards of 16,000 acres. Of flower seeds, sweet peas are cultivated on a large scale, 1,600 acres being reported in 1916.

The largest acreage is in onion, carrot, lettuce, radish, and spinach, of which there are hundreds of acres of each. Other vegetable seeds grown are parsley, parsnip, endive, beet, salsify, chicory, mustard, celery.

In Humboldt County, near Eureka, large quantities of Dutch bulbs are raised successfully in great variety; among others, 3,050,000 single and double tulips, 1,500,000 narcissus, 600,000 hyacinths, 600,000 crocus, 115,000 Spanish, English, and Dutch iris, 10,000 lilium congiflorum, 5,000 lilium speciosum, and 10,000 gladiolus. In addition to the above there are 5,000,000 azalias, rhododendrons, conifers, and other nursery stock. In seed and bulk cultivation the leading counties are San Benito, Santa Clara, Sacramento, San Joaquin, Yolo, and for bulbs Humboldt and Santa Cruz. In the latter county there are 18 acres of fresias, 5 acres of other bulbs, 3 acres of callas, and about 8 acres in sweet peas.

RANK OF STATES BY ACREAGE IN THE PRODUCTION OF CEREALS AND PRINCIPAL CROPS

Production of Barley, 1916.

State	Acreage	Production, bushels	Average per acre, bushels
1. North Dakota	1,725,000	26,738,000	15.5
2. Minnesota	1,375,000	26,125,000	19.0
3. California	1,190,000	33,320,000	28.0
4. South Dakota	825,000	18,728,000	22.7
5. Wisconsin	610,000	18,300,000	30.0
6. Kansas	300,000	4,800,000	16.0
7. Iowa	295,000	8,702,000	29.5
8. Idaho	190,000	7,410,000	39.0
9. Washington	165,000	6,814,000	41.3
10. Colorado	160,000	5,120,000	32.0
11. Oregon	140,000	5,390,000	38.5
12. Nebraska	110,000	3,080,000	28.0
13. Michigan	100,000	2,450,000	24.5
14. Montana	95,000	2,660,000	28.0
15. New York	81,000	1,887,000	23.3
16. Illinois	60,000	1,192,000	32.0
17. Utah	34,000	1,224,000	36.0
18. Ohio	33,000	917,000	27.8
19. Arizona	32,000	1,120,000	35.0
20. Wyoming	25,000	825,000	33.0
21. Vermont	15,000	412,000	27.5
22. Indiana	15,000	405,000	27.0
23. Virginia	13,000	358,000	27.5
24. Nevada	12,000	492,000	41.0
25. Pennsylvania	12,000	300,000	25.0
26. New Mexico	11,000	308,000	28.0
27. Tennessee	10,000	237,000	23.7
28. Texas	9,000	153,000	17.0
29. Oklahoma	8,000	100,000	12.5
30. Maryland	6,000	192,000	32.0
31. Maine	6,000	156,000	26.0
32. Kentucky	6,000	156,000	26.0
33. Missouri	5,000	100,000	20.0
34. New Hampshire	1,000	28,000	28.0
United States	7,674,000	180,927,000	23.6

No barley is imported.
The exports of barley for the last three years have been as follows:

Calendar year	Bushels	Value
1914	18,208,186	$11,183,382
1915	26,529,403	19,312,683
1916	22,485,920	19,752,951

Production of Buckwheat, 1916.

State	Acreage	Production, bushels	Average per acre, bushels
1. New York	290,000	3,480,000	12.0
2. Pennsylvania	270,000	3,780,000	14.0
3. Michigan	75,000	825,000	11.0
4. West Virginia	36,000	659,000	18.3
5. Virginia	25,000	480,000	19.2
6. Wisconsin	20,000	280,000	14.0
7. Ohio	19,000	336,000	17.7
8. New Jersey	15,000	285,000	19.0
9. Maine	14,000	336,000	24.0
10. Vermont	12,000	210,000	17.5
11. Maryland	10,000	189,000	18.9
12. North Carolina	10,000	175,000	17.5
13. Minnesota	10,000	150,000	15.0
14. Iowa	10,000	150,000	15.0
15. Indiana	8,000	144,000	18.0
16. Illinois	4,000	68,000	17.0
17. Missouri	4,000	56,000	14.0
18. Connecticut	3,000	57,000	19.0
19. Delaware	3,000	57,000	19.0
20. Tennessee	3,000	54,000	18.0
21. Massachusetts	2,000	32,000	16.0
22. New Hampshire	1,000	20,000	20.0
23. Nebraska	1,000	17,000	17.0
United States	845,000	11,840,000	14.0

No buckwheat is imported.

Exports.

Calendar year	Bushels	Value
1914	196,460	$191,668
1915	497,150	470,387
1916	378,486	380,453

Production of Corn, 1916.

State	Acreage	Production, bushels	Average per acre, bushels
1. Illinois	10,400,000	306,800,000	29.5
2. Iowa	10,050,000	366,825,000	36.5
3. Nebraska	7,400,000	192,400,000	26.0
4. Kansas	6,950,000	69,500,000	10.0
5. Texas	6,900,000	131,100,000	19.0
6. Missouri	6,775,000	132,112,000	19.5
7. Indiana	5,137,000	174,658,000	34.0
8. Georgia	4,000,000	62,000,000	15.5
9. Oklahoma	3,950,000	53,325,000	13.5
10. Alabama	3,735,000	46,688,000	12.5
11. Ohio	3,675,000	115,762,000	31.5
12. Kentucky	3,400,000	95,200,000	28.0
13. Mississippi	3,400,000	47,600,000	14.0
14. Tennessee	3,250,000	84,500,000	26.0
15. South Dakota	2,950,000	84,075,000	28.5
16. North Carolina	2,900,000	53,650,000	18.5
17. Arkansas	2,550,000	45,135,000	17.7
18. Minnesota	2,520,000	84,420,000	33.5
19. Virginia	2,140,000	60,990,000	28.5
20. Louisiana	2,134,000	44,814,000	21.0
21. South Carolina	2,065,000	32,008,000	15.5
22. Wisconsin	1,690,000	60,840,000	36.0
23. Michigan	1,650,000	45,375,000	27.5
24. Pennsylvania	1,450,000	56,550,000	39.0
25. Florida	840,000	12,600,000	15.0
26. West Virginia	725,000	22,112,000	30.5
27. Maryland	700,000	27,300,000	39.0
28. New York	540,000	16,200,000	30.0
29. North Dakota	510,000	13,515,000	26.5
30. Colorado	475,000	7,362,000	15.5
31. New Jersey	270,000	10,800,000	40.0
32. Delaware	205,000	6,970,000	34.0
33. New Mexico	125,000	2,625,000	21.0
34. Montana	74,000	1,850,000	25.0
35. California	64,000	2,048,000	32.0
36. Connecticut	63,000	2,709,000	43.0
37. Vermont	45,000	1,935,000	43.0
38. Massachusetts	42,000	1,764,000	42.0
39. Oregon	40,000	1,340,000	33.5
40. Washington	38,000	1,406,000	37.0
41. Wyoming	25,000	550,000	22.0
42. Arizona	22,000	770,000	35.0
43. Idaho	21,000	735,000	35.0
44. New Hampshire	19,000	874,000	46.0
45. Maine	15,000	645,000	43.0
46. Utah	13,000	429,000	33.0
47. Rhode Island	11,000	341,000	31.0
48. Nevada	1,000	34,000	34.0
United States	105,954,000	2,583,241,000	24.4

The imports and exports of corn during the last three years have been as follows:

Calendar year	Imports		Exports (domestic)	
	Bushels	Value	Bushels	Value
1914	15,821,177	$9,676,050	15,626,149	$12,246,293
1915	6,499,424	3,717,501	48,263,642	38,479,682
1916	2,155,029	1,234,874	53,543,227	46,935,955

Production of Oats, 1916.

State	Acreage	Production, bushels	Average per acre, bushels
1. Iowa	5,050,000	186,850,000	37.0
2. Illinois	4,470,000	172,095,000	38.5
3. Minnesota	3,325,000	88,112,000	26.5
4. North Dakota	2,500,000	53,750,000	21.5
5. Nebraska	2,250,000	79,875,000	35.5
6. Wisconsin	2,200,000	81,400,000	37.0
7. South Dakota	1,850,000	56,425,000	30.5
8. Indiana	1,750,000	52,500,000	30.0
9. Ohio	1,717,000	48,076,000	28.0
10. Kansas	1,550,000	36,425,000	23.5
11. Texas	1,500,000	42,750,000	28.5
12. Michigan	1,423,000	42,690,000	30.0
13. Missouri	1,290,000	32,250,000	25.0
14. New York	1,206,000	31,356,000	26.0
15. Oklahoma	1,160,000	15,080,000	13.0
16. Pennsylvania	1,130,000	35,030,000	31.0
17. Georgia	860,000	16,770,000	19.5
18. Montana	660,000	25,080,000	38.0
19. Alabama	600,000	10,500,000	17.5
20. South Carolina	500,000	9,000,000	18.0
21. North Carolina	375,000	6,562,000	17.5
22. Oregon	360,000	17,280,000	48.0
23. Tennessee	360,000	7,560,000	21.0
24. Arkansas	350,000	7,350,000	21.0
25. Mississippi	320,000	5,760,000	18.0
26. Idaho	310,000	13,330,000	43.0
27. Kentucky	300,000	6,300,000	21.0
28. Colorado	290,000	9,570,000	33.0
29. Washington	275,000	14,300,000	52.0
30. Virginia	250,000	5,750,000	23.0
31. Wyoming	245,000	8,575,000	35.0
32. California	200,000	6,500,000	32.5
33. Maine	170,000	6,120,000	36.0
34. West Virginia	140,000	3,220,000	23.0
35. Louisiana	110,000	2,090,000	19.0
36. Utah	103,000	4,480,000	43.5
37. Vermont	80,000	2,560,000	32.0
38. New Jersey	69,000	2,070,000	30.0
39. New Mexico	64,000	1,856,000	29.0
40. Florida	60,000	900,000	15.0
41. Maryland	46,000	1,357,000	29.5
42. Massachusetts	15,000	480,000	32.0
43. Connecticut	15,000	450,000	30.0
44. Nevada	14,000	602,000	43.0
45. New Hampshire	12,000	444,000	37.0
46. Arizona	9,000	338,000	37.5
47. Delaware	4,000	120,000	30.0
48. Rhode Island	2,000	54,000	27.0
United States	41,539,000	1,251,992,000	30.1

Calendar year	Imports		Exports (domestic)	
	Bushels	Value	Bushels	Value
1914	9,429,010	$3,423,347	35,066,867	$19,026,302
1915	363,891	185,332	104,572,313	59,229,186
1916	585,217	259,677	101,411,239	53,009,919

Production of Rye, 1916.

State	Acreage	Production, bushels	Average per acre, bushels
1. Wisconsin	375,000	6,075,000	16.2
2. North Dakota	350,000	4,655,000	13.3
3. Minnesota	335,000	5,025,000	15.0
4. Michigan	325,000	4,648,000	14.3
5. Pennsylvania	260,000	4,420,000	17.0
6. South Dakota	250,000	4,500,000	18.0
7. Nebraska	192,000	3,072,000	16.0
8. Indiana	185,000	2,590,000	14.0
9. New York	151,000	2,718,000	18.0
10. Ohio	75,000	1,088,000	14.5
11. Virginia	75,000	938,000	12.5
12. New Jersey	70,000	1,330,000	19.0
13. Iowa	55,000	935,000	17.0
14. North Carolina	55,000	534,000	9.7
15. Kansas	46,000	667,000	14.5
16. Illinois	43,000	666,000	15.5
17. Oregon	30,000	510,000	17.0
18. Colorado	28,000	392,000	14.0
19. Maryland	23,000	356,000	15.5
20. Kentucky	22,000	246,000	11.2
21. Missouri	21,000	231,000	11.0
22. West Virginia	20,000	320,000	16.0
23. Tennessee	15,000	150,000	10.0
24. Georgia	13,000	124,000	9.5
25. Utah	12,000	144,000	12.0
26. Montana	10,000	205,000	20.5
27. Wyoming	10,000	155,000	15.5
28. Oklahoma	9,000	90,000	10.0
29. California	8,000	104,000	13.0
30. Connecticut	7,000	137,000	19.6
31. Washington	7,000	102,000	14.5
32. South Carolina	5,000	49,000	9.8
33. Alabama	4,000	52,000	13.0
34. Massachusetts	3,000	56,000	18.5
35. Idaho	2,000	34,000	17.0
36. Texas	2,000	20,000	10.0
37. Vermont	1,000	20,000	20.0
38. Delaware	1,000	15,000	15.0
39. Arkansas	1,000	10,000	10.0
United States	3,096,000	47,383,000	15.3

No rye is imported.

Exports (Domestic).

Calendar year	Bushels	Value
1914	7,847,235	$7,794,125
1915	13,155,788	15,350,766
1916	15,161,090	18,741,061

Production of Wheat, 1916.

State	Acreage	Production, bushels	Average per acre, bushels
1. Kansas	8,174,000	98,022,000	12.0
2. North Dakota	7,150,000	39,325,000	5.5
3. Minnesota	3,715,000	27,555,000	7.4
4. South Dakota	3,650,000	24,825,000	6.8
5. Nebraska	3,540,000	68,550,000	19.4
6. Oklahoma	3,050,000	29,585,000	9.7
7. Missouri	1,950,000	16,575,000	8.5
8. Indiana	1,620,000	19,440,000	12.0
9. Washington	1,590,000	37,635,000	23.7
10. Ohio	1,500,000	20,250,000	13.5
11. Montana	1,485,000	28,655,000	19.3
12. Illinois	1,475,000	16,225,000	11.0
13. Pennsylvania	1,375,000	26,125,000	19.0
14. Virginia	1,300,000	16,250,000	12.5
15. Texas	1,200,000	13,200,000	11.0
16. North Carolina	950,000	9,975,000	10.5
17. Kentucky	890,000	8,010,000	9.0
18. Tennessee	865,000	7,958,000	9.2
19. Oregon	850,000	19,550,000	23.0
20. Michigan	800,000	13,600,000	17.0
21. Iowa	660,000	10,450,000	15.8
22. Maryland	640,000	10,240,000	16.0
23. Idaho	634,000	15,071,000	23.8
24. Colorado	600,000	11,885,000	19.8
25. New York	430,000	9,030,000	21.0
26. California	350,000	5,600,000	16.0
27. Georgia	334,000	3,808,000	11.4
28. Utah	326,000	6,900,000	21.2
29. West Virginia	320,000	4,640,000	14.5
30. Arkansas	255,000	2,040,000	8.0
31. South Carolina	210,000	2,226,000	10.6
32. Wisconsin	188,000	3,315,000	17.6
33. Wyoming	165,000	3,560,000	21.6
34. Delaware	124,000	1,860,000	15.0
35. New Mexico	113,000	2,104,000	18.6
36. Alabama	110,000	1,045,000	9.5
37. New Jersey	90,000	1,800,000	20.0
38. Nevada	55,000	1,592,000	28.9
39. Arizona	40,000	1,160,000	29.0
40. Mississippi	6,000	90,000	15.0
41. Maine	5,000	135,000	27.0
42. Vermont	1,000	25,000	25.0
United States	52,785,000	639,886,000	12.1

Calendar year	Imports		Exports (domestic)	
	Bushels	Value	Bushels	Value
1914	1,714,130	$1,546,155	173,861,944	$187,184,100
1915	4,052,001	4,084,845	205,925,577	282,586,926
1916	8,571,509	10,749,483	154,049,686	226,746,370

Rank of States By Acreage in the Production of Potatoes, 1916.

State	Acreage	Production, bushels	Average per acre, bushels
1. New York	320,000	22,400,000	70
2. Michigan	320,000	15,360,000	48
3. Wisconsin	290,000	13,630,000	47
4. Minnesota	280,000	16,800,000	60
5. Pennsylvania	272,000	19,040,000	70
6. Ohio	140,000	6,300,000	45
7. Maine	125,000	25,500,000	204
8. Virginia	125,000	16,250,000	130
9. Illinois	125,000	7,250,000	58
10. Iowa	115,000	4,830,000	42
11. Nebraska	105,000	7,665,000	73
12. Missouri	91,000	15,460,000	60
13. New Jersey	85,000	10,370,000	122
14. California	75,000	10,575,000	141
15. North Dakota	75,000	6,975,000	93
16. Indiana	74,000	3,256,000	44
17. Kansas	70,000	4,970,000	71
18. South Dakota	65,000	4,290,000	66
19. Washington	60,000	9,900,000	165
20. Oregon	55,000	8,250,000	150
21. Colorado	50,000	6,900,000	138
22. Kentucky	49,000	4,116,000	84
23. West Virginia	48,000	4,224,000	88
24. Texas	40,000	2,000,000	50
25. Maryland	43,000	4,085,000	95
26. Montana	39,000	4,875,000	125
27. Tennessee	36,000	2,952,000	82
28. North Carolina	34,000	3,230,000	95
29. Oklahoma	34,000	1,802,000	53
30. Idaho	27,000	4,050,000	150
31. Massachusetts	25,000	2,275,000	91
32. Louisiana	25,000	1,625,000	65
33. Arkansas	25,000	1,625,000	65
34. Vermont	23,000	2,576,000	112
35. Connecticut	22,000	2,090,000	95
36. Utah	20,000	3,600,000	180
37. Alabama	20,000	1,800,000	90
38. Wyoming	18,000	2,340,000	130
39. New Hampshire	15,000	1,800,000	120
40. Florida	15,000	1,110,000	74
41. Georgia	15,000	900,000	60
42. Nevada	14,000	2,660,000	190
43. Mississippi	12,000	780,000	65
44. Delaware	10,000	900,000	90
45. South Carolina	10,000	750,000	75
46. New Mexico	8,000	816,000	102
47. Rhode Island	5,000	370,000	74
48. Arizona	1,000	115,000	115
United States	3,550,000	285,437,000	80.4

The imports of potatoes generally averaged less than half a million bushels until 1913; since then the quantities and value have been as follows:

Calendar year	Imports		Exports (domestic)	
	Bushels	Value	Bushels	Value
1914	799,728	$511,303	2,714,485	$2,238,896
1915	235,508	267,814	3,900,149	2,644,139
1916	885,665	912,463	3,229,646	3,875,549

Rank of States By Acreage in the Production of Sweet Potatoes, 1916.

State	Acreage	Production, bushels	Yield per acre
1. Georgia	94,000	7,520,000	80
2. North Carolina	87,000	9,309,000	107
3. Alabama	85,000	6,290,000	74
4. Texas	80,000	7,120,000	89
5. Mississippi	77,000	6,314,000	82
6. South Carolina	66,000	5,676,000	86
7. Louisiana	64,000	5,760,000	90
8. Virginia	39,000	5,070,000	130
9. Arkansas	35,000	3,185,000	91
10. Tennessee	27,000	2,700,000	100
11. Florida	25,000	2,500,000	100
12. New Jersey	23,000	2,300,000	100
13. Oklahoma	13,000	962,000	74
14. Kentucky	10,000	900,000	90
15. Maryland	9,000	1,134,000	126
16. Illinois	8,000	720,000	90
17. Missouri	7,000	490,000	70
18. California	6,000	960,000	160
19. Delaware	5,000	625,000	125
20. Kansas	4,000	368,000	92
21. Indiana	3,000	300,000	100
22. Iowa	3,000	273,000	91
23. West Virginia	2,000	280,000	140
24. Pennsylvania	1,000	100,000	100
25. Ohio	1,000	99,000	99
United States	774,000	70,955,000	91.7

Rank of States By Acreage in the Production of Rice, 1916.

State	Acreage	Production, bushels	Yield per acre
1. Louisiana	443,300	20,392,000	46.0
2. Texas	235,000	10,575,000	45.0
3. Arkansas	125,000	6,312,000	50.5
4. California	67,800	4,543,000	67.0
5. South Carolina	3,500	49,123	14.0
6. Mississippi	1,900	53,000	28.0
7. Georgia	800	16,000	20.0
8. Florida	700	18,000	25.0
9. Alabama	300	8,000	25.0
10. North Carolina	300	6,000	21.0
11. Missouri	200	10,000	51.0
United States	878,800	41,982,000	47.8

Calendar year	Imported*		Exported	
	Pounds	Value	Pounds	Value
1914	255,064,251	$6,286,358	50,284,435	$2,079,773
1915	290,144,034	6,372,295	67,592,348	2,772,486
1916	248,824,135	6,033,570	130,906,878	5,448,666

*Uncleaned (including paddy), cleaned, rice flour, rice meal, and broken rice.

Rank of States By Acreage in the Production of Hay (Tame), 1916.

State	Acreage	Production, tons	Yield per acre, tons
1. New York	4,500,000	7,290,000	1.62
2. Iowa	3,600,000	5,796,000	1.61
3. Missouri	3,350,000	4,355,000	1.30
4. Pennsylania	3,255,000	5,208,000	1.60
5. Ohio	3,100,000	4,867,000	1.57
6. Illinois	3,100,000	4,495,000	1.45
7. Michigan	2,750,000	4,372,000	1.59
8. Wisconsin	2,600,000	4,420,000	1.70
9. California	2,500,000	4,375,000	1.75
10. Indiana	2,300,000	3,312,000	1.44
11. Minnesota	1,890,000	3,496,000	1.85
12. Nebraska	1,850,000	4,070,000	2.20
13. Kansas	1,680,000	2,604,000	1.55
14. Maine	1,200,000	1,740,000	1.45
15. Kentucky	1,080,000	1,415,000	1.31
16. Tennessee	1,050,000	1,449,000	1.38
17. Vermont	980,000	1,666,000	1.70
18. Colorado	970,000	1,988,000	2.05
19. Oregon	850,000	1,955,000	2.30
20. Washington	836,000	2,006,000	2.40
21. Montana	825,000	1,402,000	1.70
22. West Virginia	825,000	1,270,000	1.54
23. Virginia	790,000	1,066,000	1.35
24. South Dakota	730,000	1,387,000	1.90
25. Idaho	725,000	1,812,000	2.50
26. Wyoming	580,000	1,044,000	1.80
27. Oklahoma	550,000	825,000	1.50
28. New Hampshire	529,000	767,000	1.45
29. North Dakota	520,000	884,000	1.70
30. Massachusetts	480,000	749,000	1.56
31. Texas	480,000	576,000	1.20
32. Maryland	465,000	688,000	1.48
33. North Carolina	390,000	507,000	1.30
34. Utah	384,000	845,000	2.20
35. New Jersey	375,000	585,000	1.56
36. Arkansas	375,000	469,000	1.25
37. Connecticut	370,000	574,000	1.55
38. Georgia	300,000	375,000	1.25
39. Mississippi	275,000	371,000	1.35
40. Alabama	275,000	358,000	1.30
41. Louisiana	260,000	429,000	1.65
42. South Carolina	250,000	325,000	1.30
43. Nevada	225,000	540,000	2.40
44. New Mexico	185,000	370,000	2.00
45. Arizona	165,000	627,000	3.80
46. Delaware	80,000	116,000	1.45
47. Rhode Island	60,000	81,000	1.35
48. Florida	56,000	70,000	1.25
United States	54,965,000	89,991,000	1.64

The imports and exports of hay are not large.

Calendar year	Imports		Exports (domestic)	
	Tons	Value	Tons	Value
1914	111,293	$1,167,310	50,015	$832,490
1915	41,487	640,271	172,031	3,051,227
1916	12,033	187,370	136,157	2,678,560

Hay—Estimated Produ

State	Timothy, tons	Clover, tons	Timothy and clover mixed, tons
1. New York	2,406,000	1,276,000	2,515,000
2. Nebraska	244,000	224,000	305,000
3. Iowa	1,681,000	1,101,000	2,463,000
4. Minnesota	1,014,000	822,000	1,154,000
5. South Dakota	180,000	139,000	194,000
6. Pennsylvania	1,823,000	1,016,000	1,927,000
7. Wisconsin	1,370,000	1,083,000	1,503,000
8. Ohio	1,660,000	850,000	1,215,000
9. Illinois	1,663,000	1,079,000	1,092,000
10. California	44,000	87,000	44,000
11. Missouri	1,742,000	740,000	1,089,000
12. Michigan	1,245,000	1,049,000	1,640,000
13. Kansas	117,000	143,000	182,000
14. North Dakota	221,000	44,000	71,000
15. Indiana	1,242,000	778,000	911,000
16. Colorado	238,000	40,000	119,000
17. Oregon	137,000	313,000	117,000
18. Washington	291,000	181,000	201,000
19. Montana	182,000	70,000	239,000
20. Idaho	344,000	127,000	163,000
21. Maine	505,000	261,000	653,000
22. Vermont	666,000	216,000	500,000
23. Tennessee	232,000	340,000	239,000
24. Oklahoma	2,000	2,000	4,000
25. Kentucky	467,000	297,000	283,000
26. Wyoming	94,000	21,000	73,000
27. West Virginia	521,000	209,000	375,000
28. Virginia	277,000	208,000	288,000
29. Utah	101,000	34,000	42,000
30. Texas	---	---	---
31. New Hampshire	269,000	54,000	192,000
32. Massachusetts	232,000	75,000	217,000
33. Nevada	81,000	6,000	5,000
34. Maryland	217,000	175,000	213,000
35. Arizona	---	---	---
36. New Jersey	187,000	82,000	216,000
37. Connecticut	201,000	75,000	103,000
38. Arkansas	66,000	61,000	75,000
39. North Carolina	53,000	109,000	56,000
40. Louisiana	2,000	129,000	8,000
41. Mississippi	6,000	74,000	9,000
42. Alabama	11,000	18,000	3,000
43. Georgia	9,000	13,000	8,000
44. New Mexico	7,000	---	4,000
45. South Carolina	3,000	10,000	3,000
46. Delaware	15,000	34,000	29,000
47. Rhode Island	23,000	6,000	20,000
48. Florida	1,000	1,000	---
United States	22,092,000	13,672,000	20,762,000

ction By Kinds, 1916.

Alfalfa, tons	Millet and Hungarian, tons	Other tame, tons	Grains cut green for hay, tons	Wild salt or prarie, tons	Total, all hay, tons
364,000	109,000	474,000	146,000	104,000	7,394,000
2,646,000	346,000	183,000	122,000	3,130,000	7,200,000
290,000	122,000	70,000	69,000	845,000	6,641,000
157,000	175,000	87,000	87,000	2,888,000	6,384,000
583,000	194,000	42,000	55,000	3,900,000	5,287,000
156,000	78,000	156,000	52,000	23,000	5,231,000
243,000	89,000	66,000	66,000	481,000	4,901,000
202,000	41,000	41,000	40,000	3,000	4,870,000
270,000	121,000	225,000	45,000	156,000	4,651,000
1,838,000	--------------	306,000	2,056,000	240,000	4,615,000
261,000	240,000	152,000	131,000	154,000	4,509,000
284,000	44,000	66,000	44,000	51,000	4,423,000
1,588,000	182,000	195,000	195,000	1,650,000	4,254,000
141,000	186,000	44,000	177,000	2,670,000	3,554,000
166,000	66,000	99,000	50,000	91,000	3,403,000
1,213,000	60,000	139,000	179,000	423,000	2,411,000
430,000	--------------	235,000	723,000	220,000	2,175,000
441,000	10,000	80,000	802,000	42,000	2,048,000
715,000	14,000	56,000	126,000	581,000	1,983,000
888,000	--------------	73,000	217,000	134,000	1,946,000
--------------	61,000	217,000	43,000	27,000	1,767,000
25,000	67,000	125,000	67,000	18,000	1,684,000
58,000	203,000	290,000	87,000	38,000	1 487,000
487,000	74,000	140,000	116,000	645,000	1,470,000
71,000	106,000	149,000	42,000	6,000	1,421,000
741,000	31,000	21,000	63,000	255,000	1.299,000
32,000	38,000	70,000	25,000	7,000	1,277,000
64,000	64,000	112,000	53,000	9,000	1,075,000
600,000	8,000	30,000	30,000	102,000	947,000
98,000	86,000	265,000	127,000	262,000	838,000
4,000	38,000	153,000	57,000	23,000	790.000
30,000	53,000	90,000	52,000	24,000	773,000
427,000	--------------	16,000	5,000	171,000	711,000
27,000	14,000	21,000	21,000	6,000	694,000
527,000	12,000	25,000	63,000	14,000	641,000
44,000	12,000	35,000	9,000	45,000	630,000
26,000	17,000	106,000	46,000	15,000	589,000
70,000	37,000	113,000	47,000	92,000	561,000
15,000	18,000	198,000	58,000	44,000	551,000
43,000	9,000	195,000	43,000	42,000	471,000
21,000	7,000	219,000	35,000	52,000	423,000
18,000	36,000	218,000	54,000	42,000	400.000
19,000	26,000	259,000	41,000	18,000	393,000
248,000	19,000	18,000	74,000	13,000	383,000
13,000	6,000	254,000	36,000	15,000	340,000
5,000	5,000	15,000	13,000	13,000	129,000
1,000	6,000	20,000	5,000	1,000	82,000
1,000	3,000	56,000	8,000	10,000	80,000
16,591,000	3,133,000	6,220,000	6,703,000	19,795,000	109,786,000

Rank of States By Acreage in the Production of Cotton, 1916.

State	Acreage	Production, bales	Yield per acre pounds
Texas	11,517,000	3,775,000	157
Georgia	5,344,000	1,845,000	165
Alabama	3,219,000	525,000	78
Mississippi	3,114,000	800,000	123
South Carolina	2,834,000	920,000	155
Arkansas	2,635,000	1,145,000	208
Oklahoma	2,593,000	835,000	154
North Carolina	1,432,000	646,000	215
Louisiana	1,203,000	440,000	175
Tennessee	878,000	378,000	206
Florida	197,000	43,000	105
Missouri	132,000	62,000	225
California	72,000	60,000	400
Virginia	44,000	29,000	315
All other	25,000	8,000	----------
United States	35,239,000	11,511,000	156.3

Cotton (Unmanufactured).

Calendar year	Imported		Exported		
	Pounds	Value	Bales	Pounds	Value
1914	158,694,088	$23,074,323	6,320,485	3,285,408,833	$343,904,905
1915	202,785,138	25,879,617	8,358,992	4,362,194,195	417,013,008
1916	192,386,262	37,051,534	7,007,794	3,634,032,730	543,529,808

Rank of States by Acreage in the Production of Tobacco, 1916.

State	Acreage	Production, pounds	Yield per acre, pounds
1. Kentucky	484,000	435,600,000	900
2. North Carolina	320,000	176,000,000	550
3. Virginia	190,000	129,200,000	680
4. Tennessee	102,200	81,760,000	800
5. Ohio	100,000	95,000,000	950
6. Wisconsin	43,900	55.753,000	1,270
7. South Carolina	39,000	20.280,000	520
8. Pennsylvania	36,100	49,096,000	1,360
9. Maryland	25,500	19,635,000	770
10. Connecticut	22,200	36,186,000	1,630
11. Indiana	14,800	13,764,000	930
12. West Virginia	14,100	12,690,000	900
13. Massachusetts	7,300	12,118,000	1,660
14. New York	3,700	4,551,000	1.230
15. Missouri	3,200	3.040,000	950
16. Florida	2,500	3,025,000	1,210
17. Georgia	1,300	1,534,000	1,180
18. Illinois	700	525.000	750
19. Arkansas	500	250,000	500
20. Texas	200	140,000	700
21. Louisiana	200	90,000	450
22. Alabama	200	60,000	300
23. New Hampshire	100	165,000	1,650
24. Vermont	100	160,000	1,600
United States	1,411,800	1,150,622,000	815.0

Tobacco (Unmanufactured).

Calendar year	Imports		Exports (domestic)	
	Pounds	Value	Pounds	Value
1914	57,406,522	$34,772,047	347,295,269	$43,908,364
1915	41,304,197	21,023,642	433,672,897	32,463,492
1916	49,172,869	26,856,095	483,955,105	62,833,040

CALIFORNIA FARM CROPS FOR TWENTY-FIVE YEARS, 1891-1916.

BARLEY, BUCKWHEAT, CORN, OATS, RYE, WHEAT, POTATOES, HAY.*

(Compiled from the Reports of the United States Department of Agriculture.)

California Barley Crops, 1891-1916.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1891	812,731	23.7	19,261,725	$0 61	$11,749,652
1892	845,240	24.0	20,285,760	47	9,534,307
1893	760,716	22.5	17,116,110	42	7,188,766
1894	737,895	15.2	11,216,004	45	5,047,202
1895	937,127	20.3	19,023,678	40	7,609,471
1896	918,384	21.6	19,837,094	48	9,521,805
1897	881,649	23.0	20,277,927	54	10,950,081
1898	872,833	10.5	9,164,746	65	5,957,085
1899	855,376	26.0	22,239,776	50	11,119,888
1900	889,591	16.7	14,856,170	43	6,388,153
1901	1,089,785	26.0	28,334,410	41	11,617,108
1902	1,144,274	26.0	29,751,124	63	18,743,208
1903	1,201,488	25.7	30,878,242	61	18,835,728
1904	1,237,533	22.7	28,091,999	60	16,855,199
1905	1,237,533	21.5	26,606,960	59	15,698,106
1906	1,425,000	27.2	38,760,000	54	20,930,400
1907	1,040,000	28.9	30,056,000	78	23,444,000
1908	1,082,000	23.5	25,427,000	74	18,816,000
1909	1,180,000	26.5	31,270,000	74	23,140,000
1910	1,500,000	31.0	46,500,000	55	25,575,000
1911	1,450,000	28.0	40,600,000	85	34,510,000
1912	1,392,000	30.0	41,760,000	70	29,232,000
1913	1,275,000	26.0	33,150,000	68	22,542,000
1914	1,402,000	30.0	42,060,000	59	24,815,000
1915	1,360,000	29.0	39,440,000	62	24,453,000
1916	1,190,000	28.0	33,320,000	95	31,654,000

*For production of these crops by counties, see pages 112-118.

Duty on Imported Cereals, Potatoes, and Hay.

Barley ...... 15c per bushel of 48 pounds
Wheat ...... free
Buckwheat ...... free
Corn ...... free
Wheat flour ...... free
Oats ...... 6c per bushel of 32 pounds
Rye ...... free
Potatoes ...... free
Hay ...... $2.00 per ton

NOTE.—The imports of breadstuffs are comparatively small.

The crops of barley, buckwheat, corn, oats, rye, wheat, potatoes and hay, from 1868–1903, will be found in the Report for 1913, pages 88-95.

California Buckwheat Crops, 1890-1896.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1890	677	14.5	9,816	$0 73	$7,166
1891	683	15.3	10,450	58	8,051
1892	697	16.5	11,500	53	6,141
1893	691	21.5	14,857	71	10,548
1894	691	18.0	12,438	45	5,597
1895	726	30.0	21,780	64	13,939
1896	690	18.7	12,903	39	5,032

NOTE.—The production of buckwheat is so small that it has not been recorded in recent years, the area being only a few hundred acres. The crop is raised in only twenty-four states. Very little is exported. The acreage in buckwheat in California in 1910 was only 849, producing 14,681 bushels.

California Corn Crops, 1891-1916.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1891	161,470	34.5	5,571,000	$0 71	$3,955,208
1892	72,500	30.3	2,197,000	55	1,208,213
1893	71,775	37.1	2,275,268	50	1,137,634
1894	66,751	19.3	1,288,294	57	734,328
1895	65,416	34.5	2,256,852	53	1,196,132
1896	59,529	37.0	2,202,573	53	1,167,364
1897	60,720	31.5	1,912,680	56	1,071,101
1898	45,540	26.0	1,184,040	62	734,105
1899	56,925	27.0	1,536,975	60	922,185
1900	54,079	25.0	1,351,975	61	824,705
1901	59,703	31.0	1,850,793	68	1,258,539
1902	60,300	30.5	1,839,150	77	1,416,146
1903	57,888	30.7	1,777,162	74	1,315,100
1904	54,415	28.0	1,556,269	78	1,213,890
1905	56,592	32.0	1,810,944	76	1,376,317
1906	57,158	34.9	1,994,814	67	1,336,525
1907	54,000	34.0	1,836,000	85	1,561,000
1908	50,000	32.0	1,600,000	88	1,408,000
1909	50,000	34.8	1,740,000	91	1,583,000
1910	50,000	37.5	1,875,000	80	1,500,000
1911	51,000	36.0	1,836,000	90	1,652,000
1912	52,000	37.0	1,924,000	85	1,635,000
1913	55,000	33.0	1,815,000	88	1,597,000
1914	60,000	36.0	2,160,000	87	1,879,000
1915	64,000	41.0	2,624,000	88	2,309,000
1916	64,000	32.0	2,048,000	1 24	2,540,000

California Oat Crops, 1891-1916.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1891	84,786	28.5	2,416,000	$0 60	$1,449,841
1892	67,829	29.3	1,987,000	40	794,956
1893	59,011	25.5	1,504,781	38	571,817
1894	57,831	35.6	2,058,784	44	905,865
1895	60,144	28.1	1,690,046	39	659,118
1896	58,941	31.0	1,827,171	44	803,955
1897	57,173	18.0	1,029,114	49	504,266
1898	58,888	33.0	1,943,304	50	971,652
1899	59,477	31.0	1,843,787	47	866,580
1900	60,072	24.6	1,477,771	46	679,775
1901	160,768	30.4	4,887,347	44	2,150,433
1902	168,806	30.5	5,148,583	51	2,625,777
1903	165,430	34.8	5,756,964	54	3,108,761
1904	167,084	34.1	5,697,564	57	3,247,611
1905	168,755	28.0	4,725,140	51	2,409,821
1906	163,692	31.5	5,156,298	52	2,681,275
1907	136,000	33.5	4,556,000	71	3,235,000
1908	200,000	33.5	6,700,000	67	4,489,000
1909	200,000	31.4	6,280,000	66	4,145,000
1910	200,000	37.0	7,400,000	50	3,700,000
1911	210,000	34.0	7,140,000	59	4,213,000
1912	200,000	39.0	7,800,000	55	4,290,000
1913	210,000	31.6	6,636,000	60	3,982,000
1914	220,000	35.0	7,700,000	53	4,081,000
1915	211,000	33.0	6,963,000	50	3,482,000
1916	200,000	32.5	6,500,000	72	4,680,000

California Rye Crops, 1891-1916.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1891	27,961	16.5	461,357	$0 90	$415,221
1892	28,800	11.5	331,200	67	221,904
1893	28,800	17.5	504,000	60	302,400
1894	29,376	13.2	387,763	60	232,658
1895	36,720	11.6	425,952	58	247,052
1896	38,556	14.5	559,062	60	335,437
1897	40,484	12.2	493,905	65	321,038
1898	40,079	9.0	360,711	70	252,498
1899	36,472	15.0	547,080	78	426,722
1900	38,660	13.0	502,580	58	291,496
1901	66,087	12.8	845,914	57	482,171
1902	67,409	12.0	808,908	75	606,681
1903	68,083	12.3	837,421	77	644,814
1904	67,402	7.6	512,255	78	399,559
1905	67,402	13.0	876,226	77	674,694
1906	62,684	12.8	802,355	71	569,672
1907	65,800	19.0	1,251,000	85	1,063,000
1908	66,000	12.0	792,000	88	697,000
1909	61,000	13.8	842,000	1 04	876,000
1910	7,000	17.0	119,000	86	102,000
1911	8,000	17.0	136,000	85	116,000
1912	8,000	17.6	141,000	90	127,000
1913	8,000	15.0	120,000	75	90,000
1914	8,000	17.0	136,000	85	116,000
1915	8,000	14.0	112,000	90	101,000
1916	8,000	13.0	104,000	1 16	121,000

California Wheat Crops, 1891-1916.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1891	2,815,007	13.0	36,595,000	$0 95	$34,765,336
1892	3,012,057	13.0	39,157,000	68	26,626,584
1893	2,620,490	13.3	34,852,517	53	18,471,834
1894	2,688,204	11.3	30,576,705	57	17,314,722
1895	3,084,446	13.0	40,097,798	60	24,058,679
1896	3,088,849	14.6	45,097,195	83	37,430,672
1897	3,239,402	10.0	32,394,020	83	26,887,037
1898	1,343,341	9.1	12,224,405	72	8,801,570
1899	2,393,185	14.1	33,743,909	62	20,921,223
1900	2,771,226	10.3	28,543,628	58	16,555,304
1901	2,672,547	13.0	34,743,111	60	20,845,847
1902	2,052,679	10.9	22,374,201	80	17,899,361
1903	1,868,410	11.2	20,926,192	87	18,205,787
1904	1,618,043	10.8	17,474,864	88	15,377,880
1905	1,886,238	9.3	17,542,013	82	14,384,451
1906	1,572,144	17.1	26,883,662	75	20,162,746
1907	1,368,000	15.0	20,520,000	98	20,110,000
1908	800,000	14.6	11,680,000	1 02	11,914,000
1909	825,000	14.0	11,550,000	1 11	12,820,000
1910	550,000	18.0	9,900,000	94	9,306,000
1911	480,000	18.0	8,640,000	88	7,603,000
1912	370,000	17.0	6,290,000	93	5,850,000
1913	300,000	14.0	4,200,000	95	3,990,000
1914	400,000	17.0	6,800,000	1 04	7,072,000
1915	440,000	16.0	7,040,000	95	6,688,000
1916	350,000	16.0	5,600,000	1 52	8,512,000

NOTE.—All winter wheat; no spring wheat grown in California.

California Potato Crops, 1891-1916.

Year	Acreage	Average yield per acre, bushels	Production, bushels	Average farm price, December 1	Farm value, December 1
1891	41,241	95	3,918,465	$0 54	$2,115,971
1892	38,354	75	2,876,550	59	1,697,164
1893	37,203	96	3,571,488	50	1,785,744
1894	26,786	52	1,392,872	49	682,507
1895	25,179	75	1,888,425	48	906,444
1896	22,158	80	1,772,640	53	939,499
1897	21,493	105	2,256,765	49	1,105,815
1898	20,418	95	1,939,710	55	1,066,840
1899	26,543	119	3,158,617	63	1,989,929
1900	26,808	104	2,788,032	53	1,477,657
1901	45,259	101	4,571,159	77	3,519,792
1902	47,975	118	5,661,050	58	3,283,469
1903	46,536	130	6,049,680	66	3,992.789
1904	47,001	129	6,063,129	67	4,062,296
1905	50,291	165	8,298,015	67	5,559,670
1906	50,291	125	6.286,375	74	4,651,918
1907	48,000	145	6,900,000	90	6,264,000
1908	49,000	107	5,243,000	77	4,037,000
1909	60,000	130	7,800,000	77	6,066,000
1910	70,000	130	9.100,000	85	7,735,000
1911	72,000	135	9,720,000	90	8,748,000
1912	78,000	130	10,140,000	65	6,591,000
1913	68,000	119	8,092.000	70	5,664,000
1914	75,000	138	10,350,000	70	7,245,000
1915	78,000	130	10,140,000	75	7,605.000
1916	75,000	141	10,575,000	1 40	14,805,000

California Hay (Tame) Crops, 1891-1916.

Year	Acreage	Average yield per acre, tons	Production, tons	Average farm price, December 1	Farm value, December 1
1891	1,497,437	1.40	2,096,412	$11 00	$23,060,532
1892	1,617,232	1.50	2,425,848	8 76	21,250,428
1893	1,681,921	1.69	2,842,446	7 87	22,370,059
1894	1,665,102	1.93	3,213,647	9 50	30,529,647
1895	1,681,753	1.66	2,791,710	7 06	19,709,473
1896	1,732,206	1.65	2,858,140	6 35	18,149,189
1897	1,697,562	1.60	2,716.099	9 00	24,444,891
1898	1,459,903	1.60	2,335,845	14 25	33,285,791
1899	1,708,087	1.63	2,784,182	8 00	22,273,456
1900	793,491	1.51	1,708.171	8 15	22,071,594
1901	550,325	1.82	1,001,592	7 92	7,932,609
1902	558,828	1.81	1,006,049	9 41	9,466,921
1903	550,270	2.08	1,144,562	11 66	13,345,593
1904	583,266	2.03	1,184,071	10 41	12,326,179
1905	589,119	2.40	1,413,886	10 05	14,209,554
1906	612,684	1.85	1,133,465	11 25	12,751,481
1907	637,000	1.75	1,115,000	12 50	13,938,000
1908	605,000	1.35	817,000	13 25	10,825,000
1909	650,000	1.70	1,105,000	11 50	12,708,000
1910	2,400,000	1.83	4,392,000	9 60	*42,163,000
1911	2,500,000	1.75	4,375,000	10 90	*47,688.000
1912	2,500,000	1.53	3,825,000	13 70	*52,402,000
1913	2,400.000	1.50	3,600,000	13 50	48,600,000
1914	2,700,000	1.95	5,265,000	8 20	43,173,000
1915	2,350,000	1.80	4,230,000	11 20	47,376,000
1916	2,500,000	1.75	4,375,000	12 60	55.125,000

*Including forage.

TABLE XXI.

Value of All Crops.

(From Census Reports in 1909.)

County	Cereals	Other grains and seeds	Hay and forage	Vegetables	Fruits and nuts	All other crops	Total
Alameda	$394,907 00	$31,257 00	$1,547,119 00	$810,628 00	$860,977 00	$686,079 00	$4,276,967 00
Alpine	25,833 00	8 00	49,147 00	3,291 00	1,444 00	3,483 00	83,206 00
Amador	55,405 00	90 00	229,982 00	41,583 00	59,599 00	65,651 00	452,270 00
Butte	556,107 00	767 00	806,735 00	55,314 00	797,893 00	147,699 00	2,364,515 00
Calaveras	7,881 00	755 00	217,191 00	58,093 00	53,368 00	71,880 00	409,168 00
Colusa	1,578,543 00	36,023 00	340,462 00	30,458 00	129,389 00	49,424 00	2,164,299 00
Contra Costa	604,035 00	104,487 00	1,617,610 00	1,125,668 00	499,436 00	80,818 00	4,032,054 00
Del Norte	8,877 00	164 00	85,763 00	10,605 00	2,878 00	3,665 00	111,952 00
El Dorado	15,189 00	120 00	196,638 00	41,950 00	143,924 00	73,693 00	471,514 00
Fresno	510,053 00	13,685 00	1,702,818 00	108,690 00	5,279,794 00	376,147 00	7,991,187 00
Glenn	909,796 00	700 00	327,008 00	13,644 00	35,661 00	64,101 00	1,350,910 00
Humboldt	117,802 00	19,249 00	893,913 00	175,817 00	141,493 00	90,151 00	1,438,425 00
Imperial	755,239 00		802,990 00	295,389 00	26,864 00	20,876 00	1,901,358 00
Inyo	156,416 00	3,496 00	252,610 00	57,314 00	44,047 00	18,760 00	532,643 00
Kern	500,973 00	13,580 00	953,044 00	96,968 00	159,698 00	78,992 00	1,803,255 00
Kings	550,869 00	20,704 00	1,171,101 00	140,137 00	1,219,568 00	77,735 00	3,180,114 00
Lake	129,857 00	17,641 00	196,995 00	44,701 00	90,001 00	38,601 00	517,796 00
Lassen	214,275 00	20,267 00	582,371 00	51,047 00	16,304 00	13,685 00	897,949 00
Los Angeles	806,507 00	218,428 00	3,430,698 00	1,255,093 00	6,731,532 00	2,278,626 00	14,720,884 00
Madera	1,220,003 00	900 00	290,258 00	27,995 00	126,124 00	21,138 00	1,686,418 00
Marin	19,766 00	15 00	425,987 00	42,916 00	31,816 00	13,883 00	534,383 00
Mariposa	18,515 00	1,430 00	109,699 00	28,024 00	43,025 00	29,939 00	230,632 00
Mendocino	175,678 00	927 00	526,680 00	121,941 00	166,534 00	540,218 00	1,531,986 00
Merced	1,691,556 00	11,251 00	1,355,098 00	187,563 00	147,964 00	30,142 00	3,423,574 00
Modoc	329,318 00	59,506 00	621,177 00	98,574 00	49,894 00	17,569 00	1,176,038 00
Mono	5,023 00	552 00	85,083 00	13,396 00	3,038 00	665 00	107,757 00
Monterey	1,695,220 00	57,676 00	1,125,740 00	330,296 00	438,763 00	677,840 00	4,325,535 00
Napa	168,471 00	6,224 00	465,362 00	126,348 00	766,745 00	104,292 00	1,637,442 00
Nevada	3,101 00	58 00	159,879 00	54,554 00	89,771 00	78,963 00	386,326 00
Orange	562,563 00	653,763 00	976,896 00	540,864 00	2,497,734 00	944,517 00	6,176,337 00
Placer	104,677 00		194,464 00	52,253 00	1,318,731 00	143,294 00	1,813,419 00
Plumas	74,736 00		299,817 00	21,772 00	3,872 00	32,722 00	432,919 00
Riverside	895,051 00	10,180 00	1,624,675 00	133,199 00	2,393,371 00	77,100 00	5,133,576 00
Sacramento	232,584 00	405,143 00	786,239 00	509,231 00	2,265,690 00	521,123 00	4,720,010 00
San Benito	268,068 00	138,590 00	963,249 00	34,425 00	281,891 00	54,932 00	1,741,155 00
San Bernardino	93,464 00	1,097 00	932,249 00	107,283 00	5,357,098 00	327,042 00	6,818,233 00
San Diego	458,836 00	91,268 00	1,110,127 00	174,869 00	941,767 00	84,269 00	2,861,136 00

San Francisco	------	3,310 00	1,460 00	190,965 00	920 00	127,271 00	323,926 00
San Joaquin	3,238,767 00	533,977 00	1,763,286 00	2,149,300 00	1,307,448 00	89,462 00	9,082,240 00
San Luis Obispo	869,268 00	517,452 00	681,886 00	141,685 00	155,094 00	116,427 00	2,481,812 00
San Mateo	260,218 00	36,742 00	361,266 00	459,470 00	73,272 00	204,403 00	1,395,371 00
Santa Barbara	585,079 00	869,908 00	771,922 00	244,205 00	538,465 00	558,671 00	3,568,250 00
Santa Clara	170,190 00	265,665 00	1,587,494 00	450,065 00	4,234,874 00	260,150 00	6,968,438 00
Santa Cruz	94,360 00	24,514 00	327,572 00	164,518 00	1,656,212 00	141,259 00	2,408,435 00
Shasta	74,831 00	1,719 00	410,532 00	85,381 00	248,442 00	118,890 00	939,795 00
Sierra	25,769 00	------	180,874 00	12,369 00	7,618 00	7,524 00	234,154 00
Siskiyou	325,312 00	6,972 00	851,817 00	130,817 00	41,170 00	70,306 00	1,426,394 00
Solano	1,292,481 00	103,660 00	572,822 00	84,337 00	1,495,713 00	20,953 00	3,569,966 00
Sonoma	50,993 00	809 00	1,170,906 00	185,749 00	2,034,805 00	1,008,116 00	4,451,378 00
Stanislaus	1,315,180 00	17,411 00	1,424,229 00	181,282 00	207,508 00	53,050 00	3,198,660 00
Sutter	588,103 00	150,486 00	419,331 00	57,368 00	470,985 00	63,149 00	1,749,422 00
Tehama	249,157 00	756 00	376,843 00	46,108 00	428,108 00	127,278 00	1,228,250 00
Trinity	12,394 00	604 00	167,713 00	58,211 00	11,874 00	18,549 00	269,345 00
Tulare	1,442,685 00	17,311 00	1,362,609 00	192,030 00	2,053,596 00	285,763 00	5,353,994 00
Tuolumne	14,453 00	183 00	167,810 00	39,885 00	31,044 00	44,121 00	297,496 00
Ventura	347,954 00	2,711,809 00	931,688 00	61,878 00	1,795,606 00	902,824 00	6,751,759 00
Yolo	1,032,710 00	112,847 00	984,115 00	126,359 00	677,099 00	341,320 00	3,274,450 00
Yuba	134,728 00	2,075 00	214,158 00	38,083 00	73,358 00	237,734 00	700,136 00
Totals	$28,039,826 00	$7,318,211 00	$12,187,215 00	$12,121,958 00	$50,706,869 00	$12,736,934 00	$153,111,013 00

FARM CROPS BY COUNTIES.

CEREALS.

Barley, Corn, Oats, Rye, Wheat, Potatoes, Hay and Forage, in 1910.

(Compiled from the reports of the Bureau of the Census.)

TABLE XXII.

Barley, Corn, and Oats.

County	Barley		Corn		Oats	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
Alameda	12,650	473,575	503	13,097	1,725	53,745
Alpine	38	1,480	----------	----------	135	7,274
Amador	1,513	29,071	301	12,526	1,354	30,813
Butte	17,705	326.447	359	14,856	1,432	54,685
Calaveras	222	4,833	80	1,776	108	2,121
Colusa	89,985	1,949,223	706	16,619	771	12,556
Contra Costa	18,665	731,970	263	6,158	1,112	40,178
Del Norte	32	840	1	12	216	12,078
El Dorado	50	884	38	768	543	10,504
Fresno	32,132	694,234	1,422	37,726	1,554	20,027
Glenn	53,513	1,002,587	671	21,999	1,283	32,620
Humboldt	1,296	65,991	253	7,633	2,823	75,803
Imperial	36,986	908,916	690	14,419	30	372
Inyo	678	19,381	1,883	57,917	573	28,875
Kern	32,492	517,029	466	7,132	82	770
Kings	19,287	402,432	2,274	43,688	109	4,490
Lake	2,825	54,758	981	26,317	843	19,914
Lassen	3,244	63,471	4	93	977	25,647
Los Angeles	32,804	785,129	9,084	249,295	973	38.720
Madera	90,341	1,170,945	1	50	10,569	175,047
Marin	16	231	52	2,061	850	31,430
Mariposa	1,434	19,130	174	2,330	55	1,100
Mendocino	1,904	43,370	533	14,454	3,087	81,959
Merced	88,145	2,009,531	1,877	52,778	19,843	338,041
Modoc	8,650	227,473	6	209	728	22,138
Mono	----------	----------	4	160	42	3,000
Monterey	98,923	2,026,334	845	15,552	8,734	240,760
Napa	3,048	58,300	2,389	59,579	1,366	32,155
Nevada	30	249	5	208	119	1,559
Orange	27,384	671,526	3,054	91,643	995	30,858
Placer	1,318	17,128	27	1,055	3,030	40,397
Plumas	1,260	12,216	----------	----------	2,193	75,606
Riverside	56,946	958,526	372	12,421	3,767	85,540
Sacramento	4,599	75,575	795	34,089	4,174	66,949
San Benito	10,955	307,215	401	5,389	776	13,826
San Bernardino	3,260	85,480	920	14,839	436	16,598
San Diego	17,745	284,677	4,544	71,874	7,690	177,485
San Francisco	----------	----------	----------	----------	----------	----------
San Joaquin	125,114	3,827,187	2,547	57,028	23,208	396,661
San Luis Obispo	26,370	667,718	1,509	24,015	1,139	35,884
San Mateo	917	26,001	11	164	16,125	462,566
Santa Barbara	26,294	683,605	1,240	25,979	9,494	233,171
Santa Clara	8,903	200,893	411	9,791	247	9,424
Santa Cruz	1,000	34,226	1,136	22,284	2,282	59,812
Shasta	1,298	21,551	163	4,655	723	8.915
Sierra	466	7,362	1	40	526	11,431
Siskiyou	4,282	60,118	89	3,165	3,148	93,076
Solano	41,647	1,263,357	91	935	1,306	25,711
Sonoma	361	8,795	1,681	44,331	468	20,156
Stanislaus	57,529	828,628	662	12,297	38,546	688,542
Sutter	27,457	491,720	761	22,373	3,568	56,823
Tehama	11,402	177,518	100	2,613	1,032	28,138
Trinity	39	1,210	51	1,833	150	2,667
Tulare	27,017	553,481	2,527	61,757	1,281	25,524
Tuolumne	579	5,055	7	156	425	7,447
Ventura	10,077	309,682	2,409	58,995	1,138	27,901
Yolo	49,530	1,236,884	201	5,123	515	12,365
Yuba	2,801	36,806	360	5,645	1,740	31,834
Totals	1,195,158	26,441,954	51,935	1,273,901	192,158	4,143,688

NOTE.—The acreage in buckwheat in 1910 was only 849, producing 14,681 bushels.

TABLE XXIII.

Rye, Wheat, Kaffir Corn, and Milo Maize.

County	Rye		Wheat		Kaffir corn and Milo maize	
	Acres	Bushels	Acres	Bushels	Acres	Bushels
Alameda			1,075	21,535		10
Alpine			618	19,464		
Amador			293	5,169		
Butte			20,894	245,743	409	9,529
Calaveras			51	439	5	48
Colusa	77	987	11,168	221,549	2,598	48,418
Contra Costa			2,443	53,332		
Del Norte	2	112				
El Dorado	117	609	193	3,201		
Fresno	100	1,000	7,829	97,391	1,689	37.506
Glenn			17,541	232,911	162	4,972
Humboldt	14	181	134	3,370		
Imperial			125	2,559	9,789	213,781
Inyo			1,715	50,858		
Kern	30	1,500	12,924	139,375	2,813	45,828
Kings	5	100	8,684	141,978	3,931	95,010
Lake	7	140	2,563	46,131		
Lassen	526	6,018	9,938	153,863		
Los Angeles	100	745	6,760	59,866	106	2,145
Madera	100	1,400	39,468	370,499	343	4,948
Marin			57	1,155		
Mariposa	20	240	124	1,298		
Mendocino	3	61	3,906	59,195		
Merced	2,108	19,917	10,399	115,938	2,206	45,770
Modoc	406	6,633	9.362	195,924		
Mono	4	40	167	2,739		
Monterey			22,924	298,080	2	40
Napa			4,134	50,671	2	35
Nevada			95	1,279		
Orange			793	10,797	189	3,557
Placer			5,721	62,167	8	161
Plumas	704	5,250	766	10,313		
Riverside			11,817	159,434	44	580
Sacramento			10,704	103,728	2	43
San Benito	15	125	4.451	57,535		
San Bernardino			100	200	1,216	15,391
San Diego	6	50	7,268	82,012	17	282
San Francisco						
San Joaquin	1,843	17,476	24,786	310,587	2,968	32,786
San Luis Obispo			33,608	428,636	1	24
San Mateo			68	1,473		
Santa Barbara	3	30	2,300	27,892		
Santa Clara			376	10,198		
Santa Cruz			217	3,629		
Shasta			3,783	45,022		
Sierra	238	2,546	383	6,389		
Siskiyou	306	3,653	17,872	224,512		
Solano			20,924	391,753		
Sonoma			56	1,445		
Stanislaus	245	1,560	22,068	258,121	4,448	80,343
Sutter	40	250	14,537	176,750	352	7,750
Tehama			6.090	84,009		
Trinity	7	35	377	5,274		
Tulare	1	25	66,567	761,459	10,987	288,382
Tuolumne			277	5,373		
Ventura			2,896	67,366		
Yolo			13,452	237,393	21	710
Yuba			10,376	74,227		
Totals	7,027	70,683	478,217	6,203,206	44,308	938,049

TABLE XXIV.

Hay and Forage.

County	Hay and forage		County	Hay and forage	
	Acres	Tons		Acres	Tons
Alameda	80,735	113,534	Placer	16,034	13,404
Alpine	3,846	5,815	Plumas	30,152	34,038
Amador	14,449	17,961	Riverside	88,430	141,794
Butte	55,962	91,832	Sacramento	56,936	70.548
Calaveras	15,281	15.686	San Benito	64,064	84,380
Colusa	29,581	45.779	San Bernardino	42,608	76,359
Contra Costa	88,937	129,080	San Diego	82,049	86,559
Del Norte	3,052	10,131	San Francisco	103	150
El Dorado	12,115	11 685	San Joaquin	104,916	174,448
Fresno	95,265	214,659	San Luis Obispo	55,000	70,225
Glenn	25,143	37,594	San Mateo	19,060	28,982
Humboldt	30,018	119,613	Santa Barbara	50,070	70,146
Imperial	57,064	101 763	Santa Clara	83,553	127.006
Inyo	16,209	43,605	Santa Cruz	18,037	25,244
Kern	58,955	112,995	Shasta	35,341	46,578
Kings	57,749	158[illegible]	Sierra	20,622	22,234
Lake	12,653	19,089	Siskiyou	57,976	100,113
Lassen	62,758	92,634	Solano	39,693	57,028
Los Angeles	154,048	316,541	Sonoma	62,351	87,949
Madera	17,606	29,978	Stanislaus	69,432	178,643
Marin	17.460	37,972	Sutter	32,744	57,017
Mariposa	6,521	6,049	Tehama	24,343	44,039
Mendocino	27,015	38,085	Trinity	5,350	8,929
Merced	68,917	173,335	Tulare	91,595	188,810
Modoc	75,479	118.906	Tuolumne	8,624	9,584
Mono	6,947	12,118	Ventura	51,546	78,926
Monterey	83,647	109,848	Yolo	45,859	104,733
Napa	26,061	39,331	Yuba	17,010	18.188
Nevada	8,725	9.497			
Orange	47,651	87,655	Totals	2,533,347	4,327,130

TABLE XXV.

Potatoes and Sweet Potatoes.

County	Potatoes, acreage		Sweet potatoes, acreage	
	1900	1910	1900	1910
Alameda	1,854	1,655	1	2
Alpine	14	22		
Amador	108	125		1
Butte	152	171	2	21
Calaveras	65	147	2	
Colusa	98	439	10	6
Contra Costa	1,583	12,687	9	
Del Norte	97	69	1	
El Dorado	71	113		
Fresno	253	218	27	57
Glenn	36	24	4	1
Humboldt	1,173	1,108	1	
Imperial		60		9
Inyo	167	326	1	
Kern	672	339	22	31
Kings	46	194	9	19
Lake	141	182	7	
Lassen	286	259		
Los Angeles	2,799	4,140	218	342
Madera	12	75	1	2
Marin	724	435		
Mariposa	76	76		
Mendocino	586	616	3	
Merced	364	246	780	2,114
Modoc	245	346		
Mono	94	97		
Monterey	2,374	5,393	1	
Napa	149	530	2	
Nevada	123	106		1
Orange	1,318	1,770	75	484
Placer	28	72	1	
Plumas	114	100		
Riverside	688	309	20	57
Sacramento	5,036	1,406	117	
San Benito	147	205		
San Bernardino	406	444	25	55
San Diego	355	374	22	27
San Francisco	336	87		2
San Joaquin	9,895	21,313	88	19
San Luis Obispo	406	955	6	3
San Mateo	500	971	5	
Santa Barbara	826	1,524	7	28
Santa Clara	988	1,085		
Santa Cruz	1,007	1,080	1	1
Shasta	305	243	17	16
Sierra	55	46		
Siskiyou	478	655	2	
Solano	114	311		
Sonoma	3,260	2,279	2	
Stanislaus	30	207	31	1,647
Sutter	222	218	48	41
Tehama	150	112	6	30
Trinity	146	143		
Tulare	253	677	15	46
Tuolumne	107	114		2
Ventura	220	264	5	10
Yolo	206	402	12	31
Yuba	100	124	1	6
Totals	42,098	67,688	1,607	5,111

TABLE XXVI.

Dry Edible Beans and Peas.

County	Dry beans		Dry peas	
	Acres	Bushels	Acres	Bushels
Alameda	86	2,933	215	5,794
Alpine	----------	3	----------	----------
Amador	3	31	----------	----------
Butte	27	150	----------	----------
Calaveras	8	238	2	16
Colusa	1,083	20,087	14	186
Contra Costa	2,298	65,748	----------	----------
Del Norte	----------	10	4	60
El Dorado	1	30	----------	----------
Fresno	9	155	6	172
Glenn	----------	----------	----------	----------
Humboldt	18	392	517	9,056
Imperial	----------	----------	----------	----------
Inyo	70	1,055	1	10
Kern	26	648	----------	----------
Kings	21	576	15	75
Lake	----------	----------	----------	----------
Lassen	----------	----------	----------	----------
Los Angeles	3,874	105,011	14	311
Madera	15	333	----------	----------
Marin	1	8	----------	----------
Mariposa	62	409	----------	----------
Mendocino	5	44	17	345
Merced	523	5,839	----------	----------
Modoc	88	1,567	----------	4
Mono	5	133	11	63
Monterey	1,504	29,532	154	5,218
Napa	6	61	----------	----------
Nevada	1	18	----------	----------
Orange	21,186	402,951	55	605
Placer	----------	----------	----------	----------
Plumas	----------	----------	----------	----------
Riverside	50	192	----------	----------
Sacramento	7,801	166,852	90	1,703
San Benito	59	677	----------	----------
San Bernardino	----------	----------	----------	----------
San Diego	3,492	45,661	12	17
San Francisco	----------	----------	----------	----------
San Joaquin	13,954	352,157	362	10,050
San Luis Obispo	11,169	207,674	85	1,209
San Mateo	466	14,435	186	4,085
Santa Barbara	22,355	267,385	12	67
Santa Clara	706	8,810	----------	2
Santa Cruz	577	12,645	2	15
Shasta	49	685	3	15
Sierra	----------	----------	----------	----------
Siskiyou	10	272	1	10
Solano	2,553	65,755	----------	----------
Sonoma	7	83	----------	----------
Stanislaus	373	4,395	415	5,175
Sutter	2,766	76,201	----------	----------
Tehama	14	302	----------	----------
Trinity	4	275	----------	----------
Tulare	21	267	10	60
Tuolumne	3	61	----------	----------
Ventura	58,744	1,313,156	756	13,151
Yolo	1,835	51,204	----------	----------
Yuba	59	1,112	----------	----------
Totals	157,987	3,328,218	2,959	57,468

TABLE XXVII.

All other Vegetables.

(Except Potatoes, Sweet Potatoes, Dry Peas, and Beans.)

County	Acres	County	Acres
Alameda	7,459	Placer	408
Alpine	14	Plumas	97
Amador	315	Riverside	1,225
Butte	513	Sacramento	6,367
Calaveras	278	San Benito	183
Colusa	160	San Bernardino	813
Contra Costa	3,650	San Diego	1,131
Del Norte	29	San Francisco	466
El Dorado	197	San Joaquin	6,728
Fresno	1,391	San Luis Obispo	950
Glenn	115	San Mateo	3,210
Humboldt	675	Santa Barbara	1,588
Imperial	3,672	Santa Clara	4,241
Inyo	240	Santa Cruz	648
Kern	589	Shasta	577
Kings	674	Sierra	35
Lake	353	Siskiyou	673
Lassen	184	Solano	650
Los Angeles	13,385	Sonoma	954
Madera	256	Stanislaus	1,621
Marin	117	Sutter	303
Mariposa	193	Tehama	292
Mendocino	594	Trinity	192
Merced	380	Tulare	2,550
Modoc	549	Tuolumne	232
Mono	36	Ventura	588
Monterey	658	Yolo	1,086
Napa	428	Yuba	235
Nevada	231		
Orange	3,785	Total	79,163

TABLE XXVIII.

Sugar Beets in 1900 and 1910, by Counties.

County	1900		1910	
	Acres	Tons	Acres	Tons
Alameda	3,680	44,974	2,516	29,201
Alpine				
Amador				
Butte			711	6,977
Calaveras			1	1
Colusa	566	5,320	211	1,824
Contra Costa	524	3,688	40	250
Del Norte				
El Dorado				
Fresno			228	1,196
Glenn			1,264	9,769
Humboldt				
Imperial				4
Inyo				
Kern				
Kings			504	1,304
Lake				
Lassen			2	10
Los Angeles	697	4,856	14,191	162,059
Madera				
Marin				
Mariposa				
Mendocino				
Merced			2	24
Modoc			9	137
Mono				
Monterey	10,333	112,367	9,900	126,397
Napa				
Nevada			39	78
Orange	1,143	7,853	10,275	133,612
Placer				
Plumas				
Riverside			4	33
Sacramento	101	502	7	105
San Benito	1,080	6,587	283	3,826
San Bernardino	1,132	4,077	4,121	42,928
San Diego			21	87
San Francisco				
San Joaquin	423	2,537	132	1,429
San Luis Obispo	285	1,384	284	5,993
San Mateo				
Santa Barbara	2,426	11,388	11,320	90,849
Santa Clara	4,214	12,373	1,135	8,180
Santa Cruz	2,759	41,553	312	3,511
Shasta				
Sierra				
Siskiyou			128	245
Solano	400	4,000	4	16
Sonoma	580	5,600		
Stanislaus				
Sutter			27	250
Tehama				
Trinity				
Tulare			1,239	9,447
Tuolumne				
Ventura	10,899	87,476	14,333	149,715
Yolo			5,714	55,734
Yuba				
Totals	41,242	356,535	78,957	845,191

PART V.

HORTICULTURE.

ORCHARDS AND VINEYARDS.

Principal Counties in Orchard Fruits, Number of Trees and Vines; Avacados, Dates, Figs, Grapes, Olives, Oranges and Lemons; Small Fruits; Raisins and Currants; Cantaloupes and Watermelons; Fruit Canning; Almonds and Walnuts; Imports and Exports of Fruit.

Orchard Fruits, Grapes, Tropical Fruits, Small Fruits, and Nuts.

The acreage in fruits has never been ascertained. In comparing one year with another the number of trees or vines of bearing age is on the whole a better index of the general changes or tendencies than the quantity of product, which may vary largely, owing to favorable or unfavorable climatic conditions.

The total quantity of orchard fruits produced in 1909 was 31,502,000 bushels, valued at $18,359,000. Plums and prunes, peaches and nectarines, apples and apricots are the most important of the orchard fruits.

The production of grapes in 1909 amounted to 1,979,687,000 pounds, valued at $10,847,000, and the production of nuts was 28,378,000 pounds, valued at $2,960,000. Most of the nuts were Persian or English walnuts and almonds.

The total value of the tropical fruits produced in 1909 was $16,752,000, the value of oranges representing more than three-fourths of the total, and the value of lemons being next in importance.

In value of production among the orchard fruits, the peach ranks second. It has a wider range for possible growth than the apple. The nectarine is so similar to the peach as to be botanically classed as a variety of that fruit. It is even more difficult to grow than the apricot, and is produced almost entirely in California.

Year by year the area in fruit continues to expand in nearly all sections in the state.

There are two distinct branches of the apple industry in California; one is the growing of early varieties, like the Astrachan and Gravenstein, which are grown mostly in the Sacramento Valley and foothills; the other, the production of winter apples. The greatest apple district of the state is the Pajaro Valley, including parts of Monterey and Santa Cruz counties, centering at Watsonville.

In the production of apples on the Pacific Coast, California ranks second. According to the estimates of the United States Department of Agriculture the quantities for the last two years were as follows:

States	1915 (barrels)	1916 (barrels)
Washington	2,433,000	3,225,000
California	1,563,000	1,918,000
Oregon	1,043,000	1,285,000

California has a monopoly of apricot growing, and in canned and dried forms this is one of the leading fruits exported.

The cherry is one of the lesser orchard fruits of California, but the peach is the greatest orchard fruit of the deciduous class produced in the state.

The cultivation of dates is also progressing, but the acreage is so broken up into small holdings that it is difficult to estimate the number, but it now amounts to several hundred. They are mostly grown in the Coachella Valley, in Riverside County.

Figs are annually becoming a more important crop, the White Adriatic being the most important variety. In the production of peaches California far exceeds all other states, especially in those dried and canned, but Georgia ships more fresh peaches, California being second.

The production of pears declined for many years, owing to the ravages of the pear blight, but is now recovering from the setback the industry received. The varieties grown are comparatively few, and the Bartlett is the chief.

Prunes and plums are largely grown in certain counties, and the production of French prunes has developed into one of the largest fruit industries in the state.

Raisins are the most important fruit crop, and it is only in this state that they are produced.

The olive is another of the old Mission fruits which has come to the front again within the last few years. It thrives on a great variety of soils. The production is about equally divided between southern California and the northern and central counties.

Number of Trees and Vines in California in 1910.
(From the Reports of the Bureau of the Census.)

Crop	Bearing trees in 1910	Non-bearing trees in 1910	Total	Quantity, bushels, 1909	Value 1909
Orchard fruits—					
Peaches and nectarines	7,829,011	4,409,562	12,238,573	9,267,118	$4,573,775
Plums and prunes	7,168,705	1,599,939	8,768,644	9,317,979	5,473,539
Apricots	2,992,453	581,524	3,573,977	4,066,823	2,768,921
Apples	2,482,762	1,054,107	3,536,869	6,335,073	2,901,662
Pears	1,410,905	398,093	1,808,998	1,928,097	1,660,963
Cherries	522,304	300,063	822,367	501,013	951,624
Quinces	76,979	65,471	142,450	32,638	26,266
Mulberries	2,076	1,303	3,330	52,766	2,147
Totals	22,485,195	8,410,062	30,895,257	31,501,507	$18,358,897
Tropical fruits—					
Oranges	6,615,805	2,093,410	8,709,215	[1]14,436,180	$12,951,505
Lemons	941,293	379,676	1,320,969	[1]2,756,221	2,976,571
Pomeloes (grapefruit)	43,424	25,589	69,013	[1]122,515	143,180
Mandarins	351	23	374	[1]555	607
Tangerines	3,637	34	3,671	[1]3,581	4,188
Total citrus fruits	7,604,510	2,498,732	10,103,242	[1]15,319,052	$16,076,051
Olives	836,347	121,659	958,006	[2]16,132,412	$401,277
Figs	269,001	214,527	483,528	[2]22,990,353	260,153
Guavas	7,031	443	7,474	[2]95,053	4,018
Loquats	3,711	1,011	4,722	[1]4,516	5,830
Pomegranates	1,771	2,745	4,516	[2]30,075	968
Japanese persimmons	3,274	8,801	12,075	[3]2,696	3,344
Dates	325	19,552	19,877	[2]3,332	418
Unclassified	35	200			
Totals	[4]8,726,005	[4]2,867,670	11,593,675		[4]$16,752,101

[1]Boxes. [2]Pounds. [3]Bushels. [4]Includes limes, bananas, and citrons.

Grapes.

	Bearing	Non-bearing	Total	Quantity, pounds	Value
Grapes	144,097,670	39,526,319	183,623,989	1,979,686,525	$10,846,812

Nuts.

	Bearing trees in 1910	Non-bearing trees in 1910	Total	Quantity, pounds, 1909	Value, 1909
Almonds	1,166,730	365,961	1,532,691	6,692,513	$700,304
Persian or English walnuts	853,237	546,804	1,400,041	21,432,266	2,247,193
Black walnuts	6,582	7,905	14,487	159,374	2,562
Pecans	4,226	2,793	7,019	44,955	4,632
Chestnuts	1,763	2,948	4,711	37,153	3,474
Franquette	408	617	1,025	4,550	910
Unclassified	1,356				
Totals	*2,034,302	*931,933	2,966,235	*28,378,115	$2,959,845

*Including Oou-shue, Chili nuts, Brazil nuts, Japanese chestnuts, beechnuts, hazelnuts, French nuts, Japanese walnuts, pistachios, butternuts, mazettes, hickory nuts, filberts, and other nuts.

Summary.

	Bearing trees	Non-bearing trees	Total
Orchard fruits	22,485,195	8,410,062	30,895,257
Tropical fruits—citrus	7,604,510	2,498,732	10,103,242
Other tropical fruits	1,121,495	368,938	1,490,433
Total tropical fruits	8,726,005	2,867,670	11,593,675
Nuts	2,034,302	931,933	2,966,235
Total trees	33,245,502	12,209,665	45,455,167
Grapevines	144,097,670	39,526,319	183,623,989

Acreage and Production of Small Fruits, 1899-1909.

Kind	Number of farms, 1909	Acres		Quarts, 1909	Value, 1909
		1899	1909		
Strawberries	2,282	2,418	4,585	15,694,326	$1,149,475
Blackberries and dewberries	3,190	1,960	2,576	4,898,524	282,383
Raspberries and loganberries	2,524	987	1,992	5,222,117	304,169
Currants	364	724	407	852,378	43,508
Gooseberries	343	133	74	145,119	9,086
Cranberries	12		53	10,656	443
Other berries	1	59	*	1,000	150
Totals		6,281	9,687	26,824,120	$1,789,214

*Less than 1 acre.

The following table shows the quantities of the more advanced products manufactured by farmers from orchard and tropical fruits and grapes in 1909:

Product	Number of farms	Unit	Quantity, 1899	Produced, 1909
Cider	481	gallons	75,443	118,456
Vinegar	973	gallons	199,678	244,683
Wine and grape juice	2,163	gallons	5,492,216	16,005,519
Olive oil	78	gallons	8,445	95,955
Raisins and dried grapes	4,551	pounds	117,935,727	169,210,679
Other dried fruit	8,373	pounds		189,495,705

NOTE.—These figures do not include wine, grape juice, and vinegar made in regular wineries, nor olive oil made in regular factories.

Leading Counties in Fruits and Nuts.

(Value of one million and upward in 1909.)

County	Value	County	Value
Los Angeles	$6,731,000	Sonoma	$2,034,000
San Bernardino	5,357,000	Ventura	1,795,000
Fresno	5,279,000	Santa Cruz	1,656,000
Santa Clara	4,234,000	Solano	1,495,000
Riverside	2,393,000	Placer	1,318,000
Orange	2,497,000	San Joaquin	1,307,000
Sacramento	2,265,000	Kings	1,219,000
Tulare	2,053,000		

Total Value of All Crops, by Counties.

(Value of four million dollars and upward in 1909.)

(Compiled from the Reports of the Bureau of the Census.)

County	Value	County	Value
Los Angeles	$14,720,000	Tulare	$5,353,000
San Joaquin	9,082,000	Riverside	5,133,000
Fresno	7,991,000	Sacramento	4,720,000
Santa Clara	6,968,000	Sonoma	4,451,000
San Bernardino	6,818,000	Monterey	4,325,000
Ventura	6,751,000	Alameda	4,276,000
Orange	6,176,000	Contra Costa	4,032,000

NOTE.—These figures are for the value of crops only, and do not include wine and other products.

The three leading crops on the basis of value in California in 1909 according to the census reports were:

Crop	Acreage	Production	Value
Fruit and nuts			$50,706,869
Hay and forage	2,533,347	4,327,130 tons	42,187,215
Barley	1,195,158	26,441,954 bushels	17,184,508

CALIFORNIA FRUITS.

Apples.

Apple growing in California is widely distributed. From 100 to 500 acres or more of bearing trees occur in nearly every county in the state, but a very large proportion of the commercial crop is produced in two or three sections. The Pajaro Valley, which includes the southern part of Santa Cruz County and the northern part of Monterey County, perhaps more commonly called the Watsonville district, is the most important apple-growing section in California, the two counties named producing nearly 65 per cent of the entire crop of the state. The Sebastopol section of Sonoma County is the second largest district, that county producing about 16 per cent of the normal crop of the state.

The estimated production of early and of late varieties of apples in the United States in 1915 was 26,330,000 barrels of early varieties, and 50,340,000 barrels of late varieties, or a total of 76,670,000 barrels. In California the proportion was 625,000 barrels of early varieties and 938,000 barrels of late varieties, or a total of 1,563,000 barrels. The designations early and late are based on varieties, those which have normally a short period of use being grouped as early and the varieties that are commonly stored or possess naturally long-keeping quality as late. There are 35 varieties which constitute nearly 90 per cent of the crop in the United States, the other 10 per cent being made up of several hundred varieties.

The Avocado.

While the raising of avocados is still in its infancy, it promises to become a popular industry in the state. According to the Report of the California Avocado Association, there are approximately 25,000 budded trees in the state planted in orchard form. Of this number probably 15,000 are of what would be considered first-class marketable varieties. The better known trees in the vicinity of Los Angeles bear from 400 to as high as 2,000 fruits each, which, at the current prices of 50 cents to $1.00 each, give gross incomes of from $200 to $1,000 per tree. Such returns must, however, be considered as exceptional and of little interest to the prospective planter. It should be stated, however, that at present prices for fruit, an income of $200 per tree would be considered below the average.

There are approximately 35,600 trees in nursery stock, of which 20,000 will be planted this year. Under present conditions large plantings of nursery stock is not possible because of the fact that Mexican seed can not be imported. Native-grown seed is rapidly increasing and the development of the industry will not be seriously affected. It will be several years before the production of good avocados will begin to increase rapidly, as the newly-planted orchards will not come into full bearing until that time. The general opinion is that the market will increase as rapidly as the production. Rapid strides are being made in the science of avocado growing and the knowledge of the fruit and its use is rapidly extending. The avocado has the highest food value of any fruit cultivated, and is certain to become a standard commercial article.

Dates.

While date trees can be grown wherever the orange is grown, they will not properly mature in any except the hottest and driest portions of the state. According to Dr. J. Eliot Coit, pomologist, California Experiment Stations, the requisite conditions may be found in many places throughout the Imperial, Coachella, and Colorado valleys, and the country around Palo Verde and Blythe, Riverside County. At other places in the state, such as the vicinity of Riverside, Redlands, Fresno, and Oroville, early dates might be grown in a small way for home consumption, or be sold in the fresh, uncured condition. While the new industry has a very promising future, it should be clearly borne in mind that date culture is a new industry, requiring experience and unusual skill on the part of the grower, and it must be carried out in regions having an extremely hot summer climate, and it must be remembered that to bring date palms into bearing costs very much more per acre than to grow any other orchard crop.

There are more than 500 named varieties of date palms, and 220 varieties have been tested out in this country by the Government Experimental Gardens and private parties.

Less than a dozen of the varieties now being tested seem to warrant planting in commercial quantities—the Deglet Noor, Itema, Tazizaoot, Hayana, Saidy, Ascherasi, Maktum, Horra, Thoory, and Agrass, being exceptionally desirable, while planting seed of the following, Deglet Noor, Menakher and Medjool is recommended.

The date has a real food value that is not understood by the uninitiated. The Arabs of the Sahara, as well as those of Arabia and Persia, use dates for more than one-third their food. Dates, being 56 to 70 per cent sugar, preserve themselves and will keep indefinitely.

While of many varieties, dates may practically be classed as of three sorts—soft, dry, and semi-dry. The Deglet Noor is probably the best of the latter class. Dates are grown principally in the Coachella Valley, in Riverside County. The acreage of dates is so broken up into a number of small holdings that it is difficult to estimate the area, but it now amounts to several hundred acres.

The important feature now in the development of this new industry will be to get offshoots of good varieties. France has issued a decree prohibiting exportation of Deglet Noor offshoots to any countries, with the exception of Tunis and Morocco. This variety can not be secured anywhere else and such offshoots as can be purchased in this country will be very high in price. There is a question whether offshoots of any varieties can be secured from Egypt in the next three to five years. There are very few varieties from the Persian Gulf region that are worthy of propagation in this country, as very few varieties from Persia have been found that are resistant to the climatic conditions in the two valleys in the ripening season.

Thousands of seedlings are now beginning to produce fruit, and many of them are producing fruit of good quality, and a larger production is hoped for each year, as the seed is pedigreed pollination from selected males and results have been gained already that look very promising for the origination of new varieties here that will help to build up the industry and bring it to a commercial basis much sooner than could otherwise be accomplished.

The Coachella Valley, it is claimed, will produce finer dates than the Imperial or Colorado valleys, owing to the humidity being less than in the other regions. Fruit of good quality for home use can undoubtedly be produced in a large part of the San Joaquin Valley, some parts of the Sacramento Valley, and a warm coastal region, such as that around San Diego.

In 1916 the crop from imported trees in the Coachella Valley was about 12,000 pounds and the crop from seedlings was estimated by us at 30,000 pounds. The seedling crop brought an average of 20 cents per pound on the market and the fruit from the imported trees was estimated at 50 cents per pound wholesale. The fruit from the imported trees was of very good quality, although some of the earlier varieties were very soft and had to be handled with great care in order to get them to the market in good condition. The seedling fruit marketed from this valley was mostly packed in open berry baskets shipped in crates of 15 baskets to the crate and most of it carried very well.

On the other hand, the growers of the seedling fruit found that on account of the immense variation of the seedling varieties that much closer attention would have to be paid to the handling of the crop as fast as it ripens and also to those varieties that would have to be ripened artificially. There is no question but that there will be some very good varieties originated from the seedlings throughout the valley. But, on the other hand, for fruit quality that will sell on the market at good prices and that will carry long distances in the best of condition, the standard varieties such as Deglet Noor, Tazizaoot, Itema, will be the only ones that can be really depended upon until the seedling varieties are classified and standardized as to quality and shipping resistance.

The date industry at the present time looks very promising on the one hand, while on the other it is rather discouraging that there is such a shortage in offshoots of standard varieties. Men of capital are ready to invest and start plantings of commercial date gardens, but there is no stock available and until there is the industry will probably advance very slowly.

Figs.

The fig industry of California is annually becoming a more important crop. In 1884 the "White Adriatic" was introduced into Fresno County. Mr. Markarian planted the border of his vineyard to this variety, and ten years later packed figs in his raisin packing house.

The annual production of California, which is the only state that produces figs in commercial quantities, is approximately as follows, but the acreage is increasing rapidly:

	State	Fresno County
White Adriatic	5,000 tons	3,800 tons
Smyrna figs	600 tons	400 tons
Black Mission	300 tons	100 tons

TABLE GRAPES AND ALMERIA GRAPES.

Table Grapes.

According to the report of the State Board of Viticultural Commissioners, the season of 1915 was a comparatively remunerative one to the table grape shippers of the state. It followed a most depressing season of 1914, during which a great majority of table grape shippers realized no profit; most of them suffered severe financial losses and for this reason the revival in 1915 was all the more appreciated.

In point of actual tonnage of grapes the crop in 1915 was considerably short of the normal, and notably in the American River district there was only 50 per cent of a crop. However, the stand of the fruit was better, and the long dry season permitted of picking and packing practically all of the fruit that hung on the vines. This brought up the total tonnage of table grapes in the state to a figure considerably in excess of a normal pack, and the prices realized were good.

From the best information gathered from authentic sources there were 9,564 carloads of grapes shipped out of California during 1915. There was a total of 1,000 carloads either consumed in the state or sent out in light express shipments. Out of this total of 10,564 carloads, 500 cars were packed in kegs or drums in redwood sawdust as a preservative.

Of the total shipments out of the state there were 750 carloads of wine grapes sent to the Eastern markets, leaving a balance of 9,314 cars of table grapes produced and packed in the state, chiefly in crated form. A small proportion of this amount was shipped, however, in lug boxes, under refrigeration, to Eastern points by way of experiment. Estimating that there are 13 tons of crated table grapes in a carload and eight tons of grapes in a car containing grapes preserved in redwood sawdust, the total tonnage of table grapes produced in the state amounts to 125,082 tons.

It is estimated that the selling price of 8,814 cars of table grapes shipped East was $8,814,000. The selling price of 1,000 cars consumed in the state and sent out in light express shipments was $700,000, making a total selling value of the table grape crop of California for 1915 $9,514,000.

A factor influencing for the benefit of the grower the Eastern selling price of our 1915 table grapes was the short crop produced in the Eastern states during last season owing to late frosts in the Concord belts from Michigan to New York, which greatly curtailed the production in that section, and the advantage, necessarily, was reaped by the California shippers.

Production of Greek Currants and Almeria Grapes in California and Australia.

Several attempts have been made to produce Greek currants in California, but so far without success. A few years ago samples were exhibited at the Fresno County District Fair, but they were of poor quality.

Almeria grapes are another fruit that we ought to be able to produce in California under suitable conditions, but very few attempts have been made, and they have all resulted in failure. Both the Almeria grape and Greek currants are grown with success in Australia, and the Government Viticulturist of Victoria, Australia, in a recent letter expresses his surprise at these conditions, saying: "I note that you still import over a million dollars' worth of Greek currants. It seems strange that you do not grow any locally, as the Zante currant should do well in the California climate. It thrives admirably in the irrigation districts of Northern Victoria, yielding as much as three tons of dried currants to the acre, whereas the Sultana, which also does very well with us, rarely exceeds two tons.

"You refer to the vine as 'a peculiar dwarf grapevine.' It could, of course, be trained thus, but here we grow it on very large trellises, planting the vine as much as 15 feet apart. The Zante was not a success here until cincturing, or ringbarking, was introduced a dozen years ago. This operation is performed on the main stem during, or immediately after, blossoming. Without it the bulk of the fruit drops off. Since cincturing proved a success the Zante was very extensively planted, and we now produce more currants than the commonwealth can consume, with the result that prices fell considerably from $200 to $115 per ton. They have risen again recently, owing to last year's crop only being a half one.

"I am rather astonished that the Almeria grape has not proved satisfactory with you, since it is doing splendidly with us. You may, perhaps, have seen some Victorian-grown Ohanez grapes (the Almeria variety) at the Panama Exposition. It keeps here in good condition for six months and over in cool store. It has occurred to me that a peculiarity in its method of fruiting may have something to do with its nonsuccess in California.

"A recent Bulletin issued by the United States Department of Agriculture on the raisin industry confirms this view regarding Greek currants. It states in part: 'Currants have not so far been grown to any great extent in this country, not because they will not thrive here, but no one has engaged in their culture seriously enough to determine the right way to grow, prune and train them. * * * The Department of Agriculture for some years has made experiments in the growing of currant varieties of grapes on different resistant stocks and practiced on them different methods of pruning and training, with very gratifying results, and strong hopes are entertained of starting and developing this special line of the raisin industry. There seems to be no reason why this country should not produce the 35,356,000 pounds, or $1,206,000 worth of currants it has for ten years been annually importing.' "

IMPORTED ALMERIA GRAPES.

These table grapes come from the province of that name in Spain, and during the last six years their value has amounted to between $1,500,000 and $2,000,000 a year. They come into competition with late-season shipments of California Tokays, Cornichon and Emperor grapes. Cuttings of the Almeria grape have been imported into California, but the result so far has not been satisfactory.

The season for importations is from September 15 to December 15, the bulk of which is received at New York, although about one-fifth go through Boston, Philadelphia and New Orleans. The fruit is put up in barrels, the gross weight, including cork-dust, being from 60 to 70 pounds, and the net weight of a barrel about 45 pounds. California Malagas come in the most direct competition with Almeria grapes, being of a similar color and somewhat similar flavor, although not near as good as a keeper.

Almeria Grapes Imported.

(Duty, 25 cents per cubic foot capacity of barrel or packages.)

Year	Cubic feet	Value	Year	Cubic feet	Value
1907	1,298,469	$1,575,521	1912	2,000,841	$2,331,504
1908	2,234,508	2,743,356	1913	1,135,942	1,359,415
1909	1,203,419	1,575,620	1914	1,334,163	1,599,969
1910	1,365,310	1,682,994	1915	1,323,928	1,523,547
1911	1,485,159	1,723,022	1916	623,856	703,274

THE LOQUAT.*

This fruit is widely grown in California as an ornamental plant, and a small amount of fruit is marketed. The Census of 1910 reported 3,700 trees in bearing, producing 4,500 boxes.

GUAVAS.*

Two species of guava have been quite widely tried in this state—the strawberry guava, and the lemon guava. The former is the hardier and is worth while growing for jellies. They are only grown in California and Florida. According to the Census reports of 1910 there were upwards of 7,000 bearing trees in California, producing about 95,000 pounds of fruit.

THE JUJUBE.*

The plant is easily grown from seed or cuttings, and the fruit is used by confectioners. The fruit is edible fresh or dried, but has not been turned to commercial account.

The Persimmon.

The persimmon of the Southern States was introduced into California in early days. The widely distributed species, however, is the Japanese, of which many varieties are now fruiting in different parts of the state. Local sale in San Francisco and Los Angeles is profitable in a small way. The removal of astringency while the fruit remains firm has been successfully accomplished by Mr. Geo. C. Roeding, of Fresno, following a Japanese method. Perhaps the largest single persimmon-producing proposition in California is that of Ira Avery in Placer County. The Tane Nashi variety pays best on account of its size and earliness.

The Pomegranate.

This fruit is grown in various parts of the state, and certain quantities are profitably sold. The variety chiefly cultivated is a bright orange color, but a large number vary with a faint blush to dark red. The fruit ripens in the warmer parts of the state in October. Pomegranates for Eastern shipment have proved profitable in the Porterville district, whence nine carloads were shipped in 1913, and the fruit netted approximately $75 per ton to the growers. At the present time, California has about 125 to 150 acres planted in this fruit as follows: Porterville district, 60 to 65 acres; Fresno district, 25 to 30 acres; Imperial Valley, 15 to 25 acres; and the rest of the state 25 to 30 acres. In 1915 one firm in the Porterville district handled 7,219 boxes, which netted the growers $6,136. The only hindrance to a rapid extension of pomegranate planting in California is the lack of market demand.

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*For full details regarding the cultivation of this and other fruits, see "California Fruits," by Professor Edward J. Wickson.

PEACHES.

In the production of peaches, California leads all other states, large quantities being dried and canned, and in the shipment of fresh peaches is only exceeded by Georgia. Magnificent nectarines are grown, but in comparatively small quantities.

Shipment of Peaches in 1914 by Ten Leading States.

The 10 leading states in the shipment of peaches in 1914, each showing shipments of more than 1,000 carloads, were as follows:

State	Carloads	State	Carloads
Georgia	4,803	Colorado	2,075
California	2,983	West Virginia	1,978
Washington	2,501	New Jersey	1,556
Ohio	2,340	Utah	1,556
Michigan	2,266	Maryland	1,231

California.

The following summary gives the principal districts from which fresh peaches were shipped in 1914:

(May 25 to October 1.)

District	Carloads	District	Carloads
Newcastle	571.0	Denair	8.0
Loomis	365.0	Pasadena	8.0
Sanger	310.0	Swall	8.0
Kingsburg	250.0	Hemet	7.0
Selma	200.0	Lincoln	7.0
Penryn	162.0	Oakdale	7.0
Cucamonga	148.0	Oakland	7.0
Parlier	143.0	Anderson	5.0
Armona	141.0	Guinda	4.0
Corning	123.0	Loma	4.0
Fresno	68.5	Seville	4.0
Winters	55.0	Yettem	4.0
Del Rey	43.0	Cornwall	3.0
Tulare	43.0	Los Angeles	3.0
Clovis	40.0	Visalia	3.0
Auburn	38.0	Antioch	2.0
Hanford	30.0	Bowles	2.0
Dinuba	28.0	Merced	2.0
Yam	28.0	Laton	2.0
Fowler	20.0	Monmouth	2.0
Reedley	13.0	Winton	2.0
Sultana	12.0	Corona	1.0
Yuba City	12.0	Miley	1.0
Cutler	11.0	Stockton	1.0
Riverbank	11.0	Woodsbro	1.0
Suisun	10.3		
Oleander	10.0	State total	2,983.8

Now that the California peach growers have organized with a membership of nearly six thousand, and $1,000,000 capital, controlling 85 per cent or more of the tonnage in the state, the industry is on a sound basis, and the prices obtained have been satisfactory to the growers. In 1916 the crop amounted to about 29,000 tons.

The quality of the 1916 crop was fully up to the average, and probably about equal to that of the crop of 1915.

The average price to the grower for the 1916 crop was about 100 per cent greater than the average price for the 1915 crop. It must be borne in mind, however, that during the year of 1915, peaches reached the lowest price known to the industry. Taking, however, a period of five years, the current price for the 1916 crop is probably not over 10 or 15 per cent above the average for that length of time.

FRESH DECIDUOUS FRUITS.

Statement Showing Number of Cars of Each Variety Shipped, 1903-1916.

Year	Apricots	Cherries	Grapes	Peaches	Pears	Plums	Apples[*]	Miscellaneous	Totals
1903	241	211	1,804	1,857	1,720	1,145	671	22	7,671
1904	97	209	1,451	559	2,186	1,053	43	28	5,626
1905	279	79	1,602	1,946	1,013	1,391	1,913	16	8,239
1906	16	150	2,052	584	1,513	1,220	748	22	6,305
1907	71	133	3,460	699	1,039	1,039	1,067	18	7,526
1908	232	208	3,819	1,980	2,702	1,763	2,201	15	12,920
1909	210	250	5,880	2,599	2,638	1,526	2,158	19	15,280
1910	290	250	4,948	2,518	2,361	1,552	2,136	17	14,072
1911	215	216	6,374	2,027	2,325	1,366	--------	16	12,539
1912	196	244	6,357	1,621	3,135	1,776	--------	15	13,344
1913	158	231	6,363	2,359	2,496	1,706	--------	19	13,332
1914	382	166	8,773	2,144	2,725	1,907	--------	49	16,146
1915	392	205	9,563	1,689	2,646	2,225	--------	58	16,778
1916	290	164	9,722	1,909	3,701	1,999	--------	106	17,891

OLIVES AND OLIVE OIL.[†]

There were very few new orchards planted in olive trees during the years 1905-1909, consequently the production of olive oil during the last few years has changed but slightly. The few orchards that are coming into bearing are mostly varieties that are used for pickling purposes, and the production of pickling olives is increasing considerably from year to year. Since 1909 a large area has been planted. The production of olives during the last few years has increased by improved methods of irrigation and fertilization, and the industry is growing in importance, and new planting is on a considerable scale. The production is about equally divided between southern California and the territory north of Tehachapi. The harvests in California generally alternate between heavy and light, although the last few years the crops have been more uniform, due to the increased care and attention to orchards.

Not more than 35 gallons of oil are produced from a ton of olives, although some manufacturers, who have heavy presses, claim to obtain 40 gallons of oil to the ton. It takes about five and one-half pounds of olives to make one gallon of pickles. The output of pickled olives is increasing much more rapidly than the production of olive oil, as California manufacturers can not compete with foreign oil as to price.

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[*] In no case do the above figures cover the entire shipment of apples, as they continue to be shipped long after the deciduous fruit season is closed.

[†] For further information regarding olives and olive oil, see the Report for 1913, pages 114-115.

The leading varieties now being planted in California are the Mission and Manzanillo, all other olives generally being treated as oil olives, as they are unfit for pickles.

In 1911 it was estimated that there were 18,000 acres of olives, producing about 8,000 tons of oil olives, and 4,000 tons for pickling. In 1907 the average net income was only $17 an acre, in 1912 the average had increased to $36.88 an acre. In 1908 the olive industry represented capital invested amounting to $4,500,000, increased in 1912 to $7,500,000. Formerly the by-products were more or less wasted; now oil, described as ''mechanical oil,'' is extracted from the pomace and used to a large extent by soap and other factories. The average yield per acre in California is about one and one-fourth tons, and the average price received by the growers for the three years, 1909-1912, for oil olives on the trees was $22 per ton. Forty per cent of the olives produced are pickling olives, and 60 per cent oil olives. The average price received by growers 1909 to 1912 for pickling olives on trees was $62 per ton. The net average receipts by growers for pickling olives was $53.50 per ton, and the net average receipts for both oil and pickling olives $36.88 per acre. The amount paid to growers in 1911, for approximately 12,000 tons, was $442,000; of this tonnage 4,000 were pickles, representing 1,200,000 gallons, and 8,000 tons of oil olives representing 280,000 gallons of oil.

The price for oil olives the last few years increased greatly, and in the southern part of the state has ranged from $45 to $50, and sometimes a few dollars higher per ton, while in pickling olives the price has ranged from $75 to $175 per ton, the higher prices being for the very best quality and the largest size. The price for oil olives on the trees was at one time from $25 to $35 per ton, pickling olives $50 to $60 on the trees and upward, depending on the quality of the fruit. Very fancy fruit commanded prices of $80, $90 and $100 on the trees.

In 1913 it was estimated that there were about 750,000 gallons of ripe olives, equal to 125,000 cases of 24 quart cans each. The estimated quantity of ripe olives in 1914 was about the same as the previous year.

It is exceedingly difficult to obtain reliable figures regarding olives and olive oil, but the California Olive Association is taking steps to gather this data, so that complete figures may be available.

In 1916 it is estimated that the output of olive oil was about 350,000 gallons, and 150,000 cases of 24-quart cans of ripe olives. One of the principal features during the year was the demand for ripe olives, and the prices increased by leaps and bounds. There was every indication of an excellent crop, but frost came earlier than any time in the last 15 years, and caused a considerable loss. The coming year promises a bumper crop, but the growers are asking such high prices that it may curtail the pack.

The largest factory for producing olive oil and pickled olives is in Los Angeles County. The leading counties in the production of olives are: San Diego, Los Angeles, Riverside, and Orange in the south, and Butte and Fresno in central California.

MANUFACTURE OF OLIVE AND OTHER OILS.

According to the reports received, there were 112 concerns in the United States in 1916 engaged in the manufacture of 262,558,661 pounds of oil from peanuts, mustard seed, kapok seed, rape seed, sunflower seed, soya beans, walnuts, corn, copra, palm kernels, and olives. The movement to grow soya beans, peanuts, and other oil-bearing seeds and nuts other than cottonseed for the manufacture of oil has received a great impetus and there will probably be several hundred establishments engaged in crushing the crops grown in 1917. The following summary shows the number of establishments engaged in the production of the several oils, together with the quantity of each kind produced during the calendar year 1916:

Kind	Number of establishments	Oil produced (pounds)	Kind	Number of establishments	Oil produced (pounds)
Olive	22	1,336,674	Corn	23	93,085,391
Coconut	9	126,884,374	Mustard seed, rape seed, soya bean, palm kernel, etc.	14	15,087,353
Peanut	50	26,164,869			

THE CITRUS FRUIT INDUSTRY.

The citrus fruit industry has reached its present development in southern California, which is made up largely of San Bernardino, San Gabriel, and San Fernando valleys, and in the coast region in Orange and Los Angeles counties. There are smaller but less favorable regions in Santa Barbara and Ventura counties, close to the mountains, and in San Diego County oranges have also been cultivated from an early period, and as far as Butte County in the north, and Tulare, Fresno, and Kern counties in central California. Most of the oranges in California are now of the Washington variety, the remainder comprising the Valencia Late as the most important variety, with fewer of the St. Michael, Mediterranean Sweet, Thompsons, Ruby, Blood, Jaffa, Seedlings, and Tangerines.

In the last few years there has been somewhat of a change in the proportion of navels shipped. For the season of 1914-1915 navel oranges probably only averaged 60 per cent of the total shipments of oranges from California.

The orange crop of northern California matures from four to six weeks earlier than it does in the southern part of the state, notwithstanding the fact that it is from 200 to 500 miles farther north. This unusual condition is due to the topography of the Pacific Coast. The two large San Joaquin and Sacramento valleys in central and northern California lie between two great mountain ranges extending north and south. The Coast Range mountains shut off the modifying influences of the sea, causing relatively higher night temperatures during the summer months than prevail in the southern part of the state. The acreage of citrus fruits in Fresno, Tulare, and Kern counties was increased in 1915 by the planting of 3,000 acres, bringing the total acreage up to about 12,000 acres.

In southern California, San Bernardino is the largest producer of oranges, with 1,951,254 bearing trees; Los Angeles has 1,674,695, Riverside 1,021,957, and Orange County 478,272. In northern and central

California, Tulare leads with 801,151, Butte 147,412, Fresno 85,781, Kern 80,940, and Sacramento 46,256.

Pomeloes are also grown to a considerable extent, the two leading counties being San Bernardino with 13,134 bearing trees, and Tulare with 8,114.

California Fruit Growers' Exchange.

Some idea of the size and value of the crop, and of the immense benefit derived by growers by a well-organized association, is shown by the results obtained by the California Fruit Growers' Exchange, the largest and most successful of all the cooperative institutions formed by the fruit growers. The following tabular statement shows the total number of boxes shipped each year, the amount received, and the average f. o. b. California price per box:

Year	Boxes shipped	F. O. B. returns	Average per box
1904–05	5,188,511	$7,124,377 00	$1 37
1905–06	4,705,515	9,936,497 00	2 11
1906–07	6,149,708	12,268,752 00	2 00
1907–08	6,628,644	11,753,544 00	1 77
1908–09	8,710,828	13,958,990 00	1 60
1909–10	7,578,801	14,831,975 00	1 96
1910–11	10,842,790	20,708,355 21	1 91
1911–12	9,232,357	17,235,822 98	1 87
1912–13	4,940,068	13,640,091 32	2 74
1913–14	11,264,865	18,990,725 54	1 69
1914–15	11,893,076	19,523,397 72	1 64

THE CITRUS CROP, 1916.

During the year ending August 31, 1916, there were shipped from California 37,229 cars of oranges and grapefruit, and 7,244 cars of lemons, making a total of 44,473 cars. The Exchange shipped 24,024 cars of oranges and grapefruit and 5,799 cars of lemons, consisting of 9,615,855 boxes of oranges, 78,433 boxes of grapefruit, and 2,407,232 boxes of lemons. The amount of money returned by the Exchange to the shippers approximates $27,703,000, which is nearly seven million dollars more than the largest preceding year, or an increase of approximately 33⅓ per cent. The delivered value of the fruit is approximately 38½ million dollars. Using the Exchange returns as a basis for computing the value of the crop, the amount returned to California for the citrus crop equals $41,348,000.

The great damage that was inflicted on California orange growers by the heavy frost which occurred the last week in December, 1911, and the first week in January, 1912, is shown in a striking manner by the returns of the California Fruit Growers' Exchange, the shipments being only 4,940,068 carloads, compared with 9,232,357 the previous season. This large decrease was in some measure made up for by better prices, the average being $2.74 per box, against $1.87 for the previous year. The total receipts were only $13,640,000, compared with $17,235,000, or a loss of over $3,595,000.

Over $100,000,000 has been brought to California by the Exchange in the eight years, 1904-5 to 1911-12, inclusive, with a loss from failure to collect or in the transmission of funds of less than $6,000.

The orange industry in California represents an investment of about $150,000,000.

The average annual yield on about 20 acres of orange grove from 1906 to 1911 was 157.6 boxes per acre. The average cost of labor and material in growing the oranges in 274 selected orchards was $136.06 per acre, of which $52.82 was for labor.

A careful estimate recently made places the production of oranges in California at 129 to 191 boxes to the acre, but there is considerable difference in the crop in various orchards. A recent publication of the United States Department of Agriculture places the average for the last five years at 157.6 boxes to the acre, and the cost of oranges delivered in the markets of the United States exactly 18 cents a dozen.

Increase in the California Citrus Crop in Ten Years.

From the figures of the Bureau of the Census, it appears that the orange crop of California made a gain of 145.4 per cent during the decade between 1899 and 1909, increasing from 5,882,000 boxes in 1899 to 14,436,000 boxes in 1909. During the same period of time, the number of trees in bearing have increased from 5,649,000 to 6,616,000, or 17.1 per cent. In 1910 there were also 2,093,000 trees of nonbearing age. In 1909, the average product per tree was 2.2 boxes. With respect to quantity of fruit, San Bernardino County rose from third rank in 1899 to first in 1909. In 1899 Los Angeles County ranked first and Riverside County second.

The value of the oranges produced in 1909 was $12,952,000, an average of 90 cents per box.

The California citrus crop for the season 1913-1914 was a record one, amounting to 48,338 cars, compared with 18,331 the previous season, when the production was greatly reduced by a killing frost, being the lowest in 12 years. Of the above carloads 45,306 were oranges, and 3,032 lemons. Previous to the season of 1913-1914 the highest was in 1910-1911, when 46,399 cars were shipped. For the season of 1914-1915 there was a large increase in the shipments of lemons and a falling off in oranges. In southern California the number of cars of lemons was 6,843 compared with 2,924 for the season of 1913-1914, while the number of cars of oranges fell from 39,024 to 33,317 cars. In northern and central California the oranges show an increase of from 6,282 the previous season to 6,427 cars, but the shipments of lemons advanced from 78 to 225 cars. Estimates for the present season ending October 31, 1916, indicate that the shipments of oranges will be about 650 cars less than the previous season, and lemons about 550 cars greater. The year 1915 was the most disastrous in the history of the lemon business, the California lemon crop having been marketed at a loss of approximately 30 cents per packed box to the grower. This result was due to several causes, the crop being the largest ever produced in California, and a heavy supply of stored fruit, much of which was in bad condition.

LEMONS.

Although lemons have been grown in California for half a century, it is only during the last 20 years that they have risen to considerable commercial importance. The lemon is less hardy than the orange and comprises from 10 to 15 per cent of the cirtus crop.

The principal varieties of lemons grow in California are the Eureka; the Lisbon, imported from Portugal; Genoa, imported from Genoa; Villa Franca, imported from Europe, and the Bonnie Brae, grown mostly in San Diego County.

California Lemon Crop, 1899-1909.

The lemon crop increased from 874,000 boxes in 1899 to 2,716,000 boxes in 1909, a gain of 1,842,000 boxes, or 210.7 per cent, although for the same period the reported number of trees of bearing age decreased from 1,493,000 to 927,000, or 38 per cent. The number of trees of non-bearing age in 1910 was 377,000. The number of boxes per tree in 1909 was 2.9; in 1899, it was just under three-fifths of one box. The value in 1909 was $2,926,000, or $1.08 per box.

The California lemon industry has been developed by small land-owners. There are a few groves which contain from 150 to 1,000 acres, but the average grove contains less than 10 acres. In San Diego County 100 growers own approximately 1,000 acres. In the San Dimas district 300 growers own 1,180 acres; in the Pomona district 75 growers own 344 acres; in the Santa Barbara district 70 growers own 407 acres. The newer planting of the last three years usually contain 5, 10 or 15 acres and seldom more than 20 acres. In a recent survey, including every important district, 11,185 acres were owned by 1,179 growers; 39 growers owned between 20 and 50 acres; 6 growers, 50 to 100 acres; 8 growers, 100 to 250 acres; 1 grower, 250 to 500 acres, and 2 growers owned more than 500 acres.

The average annual yield on about 4,500 acres of lemon orchards from 1906 to 1911 was 196.2 boxes per acre. The average value of land and water adapted to lemon culture in California is $450 per acre, and the cost of bringing a grove into bearing at six years of age, varies from $800 to $1,500 per acre, a fair average being $1,000. In 1909 there were approximately 22,000 acres of lemons in California; in 1912 there were 31,478 acres.

Practically all imported lemons come from Sicily, where the production is very large, the exports being estimated in 1911 at 57,030,543 pounds, or the equivalent of about 23,763 California carloads.

Pomelo or Grapefruit.

The pomelo or grapefruit was formerly almost exclusively grown in Florida, but its cultivation has increased in recent years, and considerable quantities are produced in Riverside, Tulare, San Diego, and other citrus counties. The leading varieties are the Nectar, Imperial, Marsh, Seedless, and Triumph.

Citron of Commerce.

The citron of commerce was grown by the Missions in the early days, but now is cultivated only to a small extent in Riverside County. At one time there was a grove of 21 acres in Los Angeles County, but it was neglected and five years ago was replaced by orange, avocado, and other trees.

THE FLORIDA CITRUS CROP.

Florida is at present the only competitor with California in the United States in the production of oranges, although in recent years citrus fruits are being produced on a small scale in Arizona, Louisiana, and Texas.

Florida Citrus Trees in Bearing, 1890, 1900, and 1910.

	1890	1900	1910
Orange	2,725,272	2,552,542	2,766,618
Lemon	85,052	22,691	11,740
Lime	17,089	41,741	45,369
Pomelo	3,135	117,336	656,213
Citron	2,480	-----------	23,234

Florida first took the lead in the production of citrus fruits in this country, but the "great freeze" of December, 1894, and February, 1895, when the temperature at some places fell to 14 and 18 degrees, was a disaster from which they are only now fully recovering. From 6,000,000 boxes shipped before the frost, the number fell the following year to 75,000.

Florida Orange Crop, 1899-1909.

The production of oranges in Florida increased from 273,000 boxes in 1899 to 4,853,000 boxes in 1909, a sixteenfold gain. The number of trees of bearing age was 2,553,000 in 1900 and 2,766,618 in 1910, an increase of 7.8 per cent. The number of trees of nonbearing age in 1910 was 1,098,000. The value in 1909 was $4,305,000, or $1.11 per box.

Florida Lemon Crop, 1899-1909.

The lemon crop increased from 2,359 boxes in 1899 to 12,367 boxes in 1909, a gain of 10,008 boxes, a fourfold gain. The number of trees of bearing age reported decreased from 22,691 in 1900 to 11,740 in 1910, or almost one-half. The number of trees of nonbearing age in 1910 was 7,329. The value of the lemon crop in 1909 was $13,753.

Orange and Lemon Crops of California and Florida, 1909-1910.
(From the Bureau of the Census.)

Orange and lemon trees of bearing and nonbearing age in 1910, and number of boxes of oranges and lemons produced in 1909, together with the value thereof, 1910:

	California	Florida
Oranges—		
Number of trees of bearing age, 1910	6,615,929	2,766,618
Number of trees of nonbearing age, 1910	2,093,101	1,097,896
Number of boxes produced in 1909	14,436,424	4,852,967
Value, 1909	$12,952,291	$4,304,987
Lemons—		
Number of trees of bearing age, 1910	927,130	11,740
Number of trees of nonbearing age, 1910	376,859	7,329
Number of boxes produced in 1909	2,715,974	12,367
Value, 1909	$2,925,759	$13,753
Pomeloes or grapefruit—		
Number of trees of bearing age	43,427	656,213

Florida Citrus Fruit Crop, 1894-95 to 1915-16.

Season	Oranges, boxes	Lemons, boxes	Season	Oranges, boxes	Lemons, boxes
1894–95	2,808,474	*713	1906–07	2,899,390	10,065
1895–96	147,000	*	1907–08	3,793,126	6,718
1896–97	216,579	1,800	1908–09†	5,250,000	----------
1897–98	357,960	1,006	1909–10†	6,100,000	----------
1898–99	1,250,000	2,200	1910–11†	4,600,000	----------
1899–1900	972,589	1,447	1911–12	4,708,350	----------
1900–01	1,350,700	1,900	1912–13	8,125,349	----------
1901–02	972,589	1,447	1913–14	6,751,080	----------
1902–03	1,465,306	5,185	1914–15	9,571,319	----------
1903–04	1,950,823	4,131	1915–16	7,775,000	----------
1904–05	2,363,058	14,433	1916–17	6,934,290	----------
1905–06	2,961,195	8,299			

*The year of the "great freeze," when the temperature fell to 14 degrees at Jacksonville and 18 degrees at Tampa on December 29, 1894, followed by one equally severe in February, 1895, which killed most of the citrus trees in the state.

†The figures for the last six years include lemons, the quantity being so small that separate records are not kept. Limes, grapefruit, and tangerines are also included. In the season 1909-10, there were about 7,100 boxes of lemons, 12,600 boxes of limes, and 553,000 boxes of grapefruit. The total for the season 1911-12 includes 810,000 boxes of grapefruit, and 156,000 boxes of tangerines; also limes and lemons, the quantities of which are comparatively small.

The prices received by Florida growers 1912-1914 are of interest as compared with the prices received in California.

Averages Received by the Florida Citrus Exchange, f. o. b. Packing-House, Season 1912-1913.

Fruits	Boxes, 1912-13	Average per box, 1912-13	Boxes, 1913-14	Average per box, 1913-14
Oranges	928,755	$1 92	796,480	$1 65
Grapefruit	393,964	1 98	224,244	2 31
Tangerines	31,787	1 92	17,921	2 51
Mixed and miscellaneous	383,539	1 84	247,885	1 95
Grand totals	1,738,045	$1 91	1,286,531	$1 83

In 1915 the number of orange trees in bearing was estimated at four million, and nonbearing one million. Grapefruit trees in bearing two and one-half million, nonbearing two million. Lemons are no longer grown commercially, but the number of limes is rapidly increasing.

Last season a crop of ten million boxes was expected, but the heavy freeze seriously damaged the orchards. The total crop was estimated at 4,007,930 boxes of oranges, 2,489,480 boxes of grapefruit, and the balance of 436,890 in tangerines and mixed.

THE CALIFORNIA RAISIN INDUSTRY.*

One of the largest and most important branches of fruit growing is the cultivation of the raisin grape, the acreage in which is now by far the largest in the world.

Raisins were first produced on a considerable scale in the southern part of the state, but Orange and Riverside counties no longer produce raisins; Los Angeles County very few; Yolo County, which at one time produced Sultanas and Thompson's Seedless in considerable quantities, now finds it more profitable to ship a large portion of the crop as table grapes, while the vineyards in Riverside and San Bernardino counties are nearly all in wine grapes.

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*For the early history of the raisin industry in California, see Reports for 1912, pages 134-139, and 1914, pages 123-126.

Counties Where Raisins Are Produced.

Of the fifty-eight counties in California, less than a dozen produce raisins in commercial quantities. At the present time the proportion of an average crop raised by each county is estimated to be approximately as follows:

The counties producing raisins in commercial quantities are as follows; the average proportion can be seen in the tables below, giving the amount of the crop for the last two years:

Fresno, Tulare, Kings, Sutter, Madera, Yolo, Yuba, San Bernardino, San Diego, Stanislaus and Merced.

Since the year 1913 the raisin crop has kept on steadily increasing. The crop in 1912 amounted to 170,000,000 pounds, but fell in 1913 to 130,000,000 pounds, until last year, when it amounted to the enormous total of 264,000,000 pounds. The exports have been exceedingly satisfactory, increasing from 14,000,000 pounds in 1914, to 24,000,000 pounds in 1915, and 75,000,000 pounds in 1916. The crop would have been the largest on record, but rains damaged Muscats so that the loss was estimated at 25 per cent, and drying was not completed until December. Thompsons and Sultanas, being earlier, escaped damage.

Varieties	Crop, 1913	Crop, 1914	Crop, 1915	Crop, 1916
Muscats	98,588,798	120,000,000	157,246,000	178,000,000
Thompson's Seedless	18,390,922	36,000,000	23,330,000	47,000,000
Sultanas	12,252,430	18,000,000	11,190,000	14,000,000
Malagas	------------	8,000,000	1,342,000	11,000,000
Feherzagoes	529,707		504,000	
Black grapes	------------		1,288,000	
Other varieties	238,143			
Bleached Thompson's Seedless	------------	------------	------------	14,000,000
Totals	130,000,000	182,000,000	194,900,000	------------
Additional outside	------------	------------	61,100,000	------------
			256,000,000	264,000,000

When raisins were first shipped East in any quantity it is impossible to say. In 1875, New York reported that up to November 1, 6,000 22-pound boxes of California raisins had been received. About 1888 Fresno appears to have shipped a considerable quantity for the first time.

The California Associated Raisin Company of Fresno now controls almost the entire acreage in raisin grapes, the contracts signed in 1916 amounting to 154,833 acres as follows:

Varieties	Acres
Muscats	97,667
Thompson's	35,725
Sultanas	7,835
Malagas	12,259
Feherzagoes	1,281
Black grapes	66

The Malagas do not represent a great deal in raisin tonnage, as a large proportion of them are shipped green as table grapes.

A recent Consular Report states that a large Canadian importer recently said that the California raisin was far superior in quality and appearance to any that he ever purchased in Europe; that they are far better packed, and are more attractive than the Spanish fruit, for which reason customers are willing to pay a little more.

Raisin Grape Varieties.

The vareties of raisin grapes are few in number. The Muscat of Alexandria and the Muscatel Gordo Blanco hold the first place, while Malaga and Feherzagoes are used to a small extent; the seedless varieties are Thompson's Seedless and Sultanas, and the Zante currant.

Owing to the war the imports of Sultanas or Seedless raisins from Smyrna, in Asia Minor, which used to be an important item, amounting in 1906 to upwards of 7,000,000 pounds, fell in 1915 to 1,056,000 pounds, and in 1916 none were imported.

Comparative Prices, Per Ton.

Varieties	Average price paid during 1909-12	Price paid by California Associated Raisin Company		
		1913	1914	1915
Muscats	$56 26	$69 30	$66 20	$72 72
Thompson's	69 40	78 27	92 50	99 67
Sultanas	55 60	65 66	77 28	88 81
Malagas	43 80	60 00	50 00	60 00
Feherzagoes	38 80	50 00	50 00	60 00

Estimated Production of Raisins, 1915, by Counties.

(Pounds.)*

County	Muscats	Thompson's	Sultanas	Malagas	Feher-zagoes	Dried grapes	Total
Fresno	127,528,000	17,972,000	7,192,000	1,026,000	478,000	1,286,000	155,806,000
Kings	16,240,000	†324,000 468,000	386,000				17,100,000
Tulare	10,178,000	2,930,000	3,218,000	226,000	10,000	2,000	16,564,000
Madera	1,656,000	28,000	20,000	64,000	16,000		1,784,000
Yuba	68,000	44,000					1,588,000
San Bernardino	940,000	†1,476,000 8,000	364,000				1,312,000
Merced	6,000	74,000	6,000	24,000			110,000
Stanislaus	60,000		4,000	2,000			66,000
San Diego	570,000						570,000
Totals	157,246,000	23,330,000	11,190,000	1,342,000	504,000	1,288,000	194,900,000
Additional outside							61,100,000
							256,000,000

†Bleached.

*Yolo and Yuba counties also produce raisins.

Estimated Production of Raisins, 1916, by Counties.
(Pounds.)

County	Muscats	Thompson's Seedless	Sultanas	Bleached Thompson's Seedless	Malagas, Feherzagoes black grapes	Total
Fresno	141,400,000	40,800,000	9,600,000	6,000,000	9,200,000	207,000,000
Tulare	13,500,000	5,000,000	3,400,000	------------	1,000,000	22,900,000
Kings	16,500,000	500,000	800,000	------------	20,000	17,820,000
Sutter	*200,000	100,000	20,000	8,000,000	------------	8,320,000
Madera	2,500,000	200,000	20,000	------------	600,000	3,320,000
Kern	1,500,000	60,000	------------	------------	------------	1,560,000
San Bernardino	1,200,000	------------	140,000	------------	------------	1,340,000
San Diego	1,200,000	------------	------------	------------	------------	1,200,000
Merced	------------	300,000	20,000	------------	160,000	480,000
Stanislaus	------------	40,000	------------	------------	20,000	60,000
Totals	178,000,000	47,000,000	14,000,000	14,000,000	11,000,000	264,000,000

*Includes about 9 tons of Thompsons from Yuba County, the vineyards in this county being nearly all nonbearing, having been planted only in the last two or three years. In 1916 Yolo County reported 200 tons of Muscat raisins, 200 Thompsons, and 800 tons of Sultanas.

Fresno is far beyond all other counties in the production of raisins of all varieties, but Sutter County has more bleached Thompsons than Fresno County.

Consumption of Raisins.

Efforts have been made, especially in recent years, to increase the consumption of raisins, and there is no reason why they should not prove successful, as there is ample room for a greatly extended use of this wholesome fruit. The United Kingdom, with a population of less than half that of the United States, consumes annually about 73,000,000 pounds of raisins and 142,000,000 pounds of currants, or a total of about 215,000,000 pounds, equal to five pounds per capita. In the United States the consumption is less than one pound and a half per capita. In other words, if the American public appreciated raisins as they have been for centuries in Europe, the acreage in raisin grapes might be more than doubled without causing overproduction.

It was in 1892 that the California raisin crop first equaled that of Spain, and it has been increasing the difference ever since. Fresno County alone now produces nearly five times the quantity of raisins produced in Spain, which held the lead for centuries.

The Spanish raisin crop in 1915 only amounted to 5,500 tons, or the lowest on record, as the summary below will show. The prices ranged so high, however, that the growers made more money than they have for years. Starting in September with quotations of from $6.75 to $9.65 per hundredweight of 112 pounds, according to the grade, they finally reached $8.68 to $13.50, respectively.

The Raisin Crop of the World.

Year	Short tons of 2,000 pounds, California	In long tons of 2,240 pounds			Australia (Victoria and South Australia), pounds	
		Spain	Turkish Sultanas	Greek currants	Raisins	Currants
1904	40,000	25,000	34,100	151,000	7,449,116	2,004,427
1905	37,000	28,200	58,300	160,000	4,367,181	2,093,076
1906	45,000	15,800	27,500	135,000	6,148,168	2,346,980
1907	70,000	27,000	47,000	156,000	12,796,000	2,922,192
1908	65,000	26,000	45,000	185,000	10,427,760	3,404,464
1909	70,000	24,000	50,000	185,000	10,924,816	4,074,336
1910	56,000	19,000	15,000	123,000	12,191,424	7,107,520
1911	51,000	15,000	25,000	157,000	12,775,056	7,465,360
1912	85,000	12,000	50,000	167,000	15,408,400	10,470,208
1913	65,000	18,500	30,000	161,000	16,231,600	11,261,040
1914	91,000	13,500	*	145,000	17,455,312	12,462,016
1915	128,000	12,500	*	125,800	16,386,832	5,969,712
1916 (estimated)	132,000	5,500	*	100,000	†	†

*No reliable figures owing to the war, but the quantity imported into the United States was 2,730,338 pounds in 1914, and 1,056,574 in 1915 and none in 1916.

†Figures for 1916 not yet available.

Raisins and Currants in Australia.

The raisins and currants produced in Australia are mostly consumed at home. The quantity at present, though not large, is increasing. Victoria and South Australia are the two states with the largest production.

California Seeded Raisin Industry, 1896-1916.

Fresno County is the center of the seeded raisin industry, where it originated. The following figures show the wonderful increase in this popular form of raisin during the last eighteen years:

Year	Tons	Year	Tons
1896	700	1907	26,000
1897	3,500	1908	24,000
1898	7,000	1909	28,000
1899	12,000	1910	31,500
1900	14,000	1911	33,000
1901	14,000	1912	43,000
1902	16,000	1913	49,000
1903	18,000	1914	35,000
1904	18,000	1915	50,000
1905	21,000	1916 (estimated)	89,000
1906	24,000		

Loose raisins are packed in 50-pound boxes; Thompson's Seedless in 12-ounce cartons, 45 to the case; seeded raisins in one-pound cartons, 36 to the case; also in 12-ounce, 45 to the case and a few in bulk in 25-pound boxes. Raisin clusters are packed in 5, 10 and 20-pound boxes.

Wooden trays for drying raisins. The Australian vineyardists have discarded the wooden tray for drying, and use wire netting under cover. It is said that they find that dry air and not sunlight accomplishes the best drying, and preserves the natural color better, and it was found that wire netting made good trays, and cost half that of wooden trays. The driers are roofed affairs, often extending clear across a vineyard or orchard. They are simply constructed. Posts of native timber are set about nine feet apart, and light 1 by 1½ inch pieces are nailed across them. A roof of sheet steel is placed above, and 10 to 12 framed net wire trays are laid in tiers about nine inches apart, one above the other on the crosspieces. The rain is kept out, and the air has free circulation.

THE GREEK CURRANT.

The Greek or Zante currant has been produced on a very large scale for centuries. They are the seedless variety of a peculiar dwarf grapevine producing a small black grape, or currant, of a peculiar flavor. It is the most important crop in Greece, as it forms nearly one-half of the total exports. The vineyards cover 150,000 acres, and produce the enormous total of from 300,000,000 pounds to 340,000,000 pounds in a favorable season.† About 33,000,000 pounds are imported annually. In 1916 the crop was very short, being estimated at only 100,000 tons, and prices were high.

Greek Currants in California.*

That the grapes from which the Greek or Zante currants are made can be grown in California has long been known. Until lately the possibility of their profitable cultivation has been doubted.

Two varieties are used—the Black Corinth and the White Corinth. The latter is not widely grown in Greece and produces currants of somewhat larger size, but of poorer quality, than the former. It has been grown commercially for many years in California and some of the growers have found it profitable.

The chief source of Greek currants is the Black Corinth, which also has been grown in California for many years. No commercial success has been obtained with this variety, however. The reason is that the conditions and methods of growing tested have failed to produce paying crops. This seems to be due to excessive vigor of the vine, which causes it to drop its blossoms without setting.

The Black Corinth grows in poor, stony soil in Greece and yields fair crops. Perhaps it might do well in soils too thin for other grapes in California. Grafted and ungrafted vines of both varieties for some years have been growing at Davis and Kearney and the crops of 1916 are interesting. The table herewith gives a summary of the results.

These vines are four and five years old and are pruned and trellised in the way usual for Sultanina (Thompson). The crop of ungrafted White Corinth was excellent, but the ungrafted Black Corinth produced practically nothing. All the grafted vines of both varieties produced excellent crops except the Black Corinth on St. George. The stock Riparia X Rupestris 3306 gave particularly good results with both varieties.

The growing of the crop is evidently possible. The next question to be solved is whether the currants can be marketed profitably in competition with those produced in Greece.

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†For details regarding the Greek currants and the "Privileged Company" which controls and markets the crop, see Report for 1912, page 140.

*By Professor Frederic T. Bioletti, University of California.

Crop of Black and White Corinth in Tons of Currants per Acre.

Black Corinth, ungrafted, Davis	.127
Black Corinth, grafted on St. George, Davis	.408
Black Corinth, grafted on Riparia, Davis	1.488
Black Corinth, grafted on Riparia, Kearney	1.451
Black Corinth, grafted on 41B, Davis	1.160
Black Corinth, grafted on 41B, Kearney	1.596
Black Corinth, grafted on 3306, Kearney	1.592
White Corinth, ungrafted, Davis	1.579
White Corinth, grafted on St. George, Davis	1.064
White Corinth, grafted on St. George, Kearney	2.360
White Corinth, grafted on 3306, Davis	2.385
White Corinth, grafted on 3306, Kearney	2.440
White Corinth, grafted on 420A, Kearney	*1.050

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*Short pruned—not trellised.

Small Fruits.

Of the small fruits strawberries lead, both in acreage and production, California being the largest producer in the West, the greatest production being in Santa Clara County. The shipments of strawberries in 1914 was estimated at 2,312 carloads from the districts named. Raspberries and loganberries, and blackberries and dewberries rank second and third, respectively.

According to the Census Reports the acreage of small fruits in 1909 was 9,687 and in 1899 it was 6,281, an increase of 54.2 per cent. The production in 1909 was 26,824,000 quarts, as compared with 14,582,000 quarts in 1899, and the value was $1,789,000 in 1909, as compared with $911,000 in 1899.

Strawberries, 1914.

	Carloads
Los Angeles section (Mar. 1 to Dec 1)—	
Puente	177.0
Gardena	119.0
Moneta	46.0
Irwindale	17.0
Azusa	14.0
Glendora	.5
Total	373.5
Sacramento section (Mar. 25 to Aug. 15)—	
Florin	249.0
Elk Grove	6.0
Total	255.0
Placer County section (April 1 to June 1)—	
Newcastle	43.0
Bowman	12.0
Loomis	10.0
Sebastopol	9.0
Penryn	2.0
Total	76.0
Fresno section (April 1 to Aug. 15)—	
Fresno	42.0
Santa Clara-Santa Cruz section (Apr. 1 to Dec. 1)—	
Gilroy, Sargent, Vega	1,010.0
Watsonville	242.0
Alviso	173.0
Mountain View	19.0
Pajaro	17.0
Aromas	14.0
Niles	13.0
Palo Alto	12.0
Salinas	7.0
Agnews	6.0
San Carlos	6.0
Capitola	4.0
Lawrence	4.0
Irvington	3.0
Menlo Park	2.0
Total	1,532.0
Siskiyou section (May 20 to July 15)—	
Pioneer	31.0
Sisson	2.5
Total	33.5
State total	2,312.0

The figures for the year 1914 are probably too high, as it is believed that a number of the cars reported shipped were less than carload shipments. Furthermore, the movement from one important section of the state was largely by boat in 1915, and no record has been obtained, whereas this area furnished a large part of the movement as reported by the railways in 1914. The berries handled by electric lines which do not move in standard carloads also constitute an element of uncertainty.

Strawberries, 1915.

Los Angeles section (Mar. 1 to Dec. 1)—		Santa Clara-Santa Cruz section (Apr. 1 to Dec. 1)—	
Gardena	27	Alviso	175
Sacramento section (Mar. 25 to Aug. 15)—		Watsonville	174
Sacramento	50	Aromas and Vegas	80
Florin	48	Gilroy	6
Total	98	Total	435
Placer County section (Apr. 1 to June 1)—		Siskiyou section (May 20 to July 15)—	
Newcastle	3	Sisson	16
Fresno section (Apr. 1 to Aug. 15)—		State total	418
Fresno	56		

The above are the leading producing districts, but it must be kept in mind that these data cover only the 1914–1915 shipments, and that seasonal variation is so great that in some cases these figures may be far in excess or much below the usual shipments. The acreage in strawberries in 1916 was estimated at 4,750 and the production 395,800 crates, and the total in the United States, 65,900 acres.

Acreage and Production of Strawberries.

Detailed estimates by states of commercial acreage picked and total production of strawberries in 1916, and of acreage to be picked in 1917, with a forecast of production based upon the condition of crop as reported on April 1, 1917, issued by the United States Department of Agriculture:

State	Acreage picked, yield per acre, and total production in 1916			Acreage to be picked, condition on April 1, and forecast of production in 1917			
	Acreage picked	Yield (quarts)	Production (crates*)	Acreage to be picked	Condition April 1, 1917 (p. ct.)	Indicated yield April 1, 1917 (quarts)	Forecast of production (crates*)
Missouri	6,800	2,250	637,500	6,950	77	1,848	535,200
Kentucky	2,000	3,400	283,300	3,500	96	3,456	504,000
Tennessee	16,950	1,800	1,271,250	16,000	78	1,560	1,040,000
Alabama	2,350	1,600	156,700	2,550	64	1,280	136,000
Mississippi	2,050	1,400	119,600	1,600	65	1,300	86,650
Louisiana	16,900	1,700	1,197,100	15,000	82	1,640	1,025,000
Arkansas	14,100	1,800	1,057,500	12,000	77	1,540	770,000
California	4,750	2,000	395,800	5,100	100	2,400	510.000
Totals	65,900	1,864	5,118,750	62,700	80	1,763	4,606,850

*24-quart crates.

The cultivation of named varieties of blackberries was begun about 1850, and since that time at least 140 different named varieties have been introduced. In 1910 the acreage in California was 2,576. The largest state acreage was in Missouri and New Jersey, with 5,975 and 4,332 acres, respectively; the total acreage in the United States amounting to 49,004 acres.

Currants are only grown in about eight states, California being one of them, Alameda County being the largest producer; gooseberries are not much grown anywhere in the United States, Indiana being the largest producer.

Cranberries only acquired commercial importance fifty or sixty years ago. They are principally grown in Massachusetts, New Jersey, and Wisconsin, and are not a success in California.

CANTALOUPES, OR MUSKMELONS, AND WATERMELONS.

It is not realized, generally, by cantaloupe growers, to what extent the commercial production of this fruit has advanced during the last ten years in all the states where they are raised. The number of cars shipped in the United States in 1914 amounted to 16,401. California is by far the largest producer.

The Imperial Valley is the earliest and probably the most important muskmelon-growing district in the United States today. The growth in production since 1905 has been remarkable, the increase being very close to 1,600 per cent in the ten years. During the season of 1915, 8,156 acres were planted to muskmelons. The average yield was 185 crates of marketable melons per acre, producing 4,722 carloads of 320 crates each.

The Turlock district in Stanislaus County, in the San Joaquin Valley, produces large quantities, and the district is notable in that it is the only Western muskmelon section not depending upon surface irrigation. The crop was not generally very profitable prior to 1915. Shipments were limited by unsatisfactory market conditions in previous years, and only a portion of the crop was moved. In 1915 the markets were good, and shipments continued for a long season, car lots going out from July 20 until October 4. The shipments were as follows:

	1914	1915
To the East	539	1,350
To the West	120	204
Totals	659	1,554

The acreage was substantially the same in both years, and the production about the same.

In 1916 the acreage in cantaloupes in the state was estimated at 16,300 and that of watermelons 4,500 acres. The total acreage in the United States being 39,700 of the former, and 98,100 of the latter.

The following summary shows the leading districts in Imperial Valley where they are grown:

California Shipments in 1914 (May 15 to August 1).

	Carloads		Carloads
Brawley	2,411	Sultana	26
Heber	777	Coachella	21
Keystone (Grape)	606	Thermal	20
Turlock	524	Imperial	4
Calexico	438	Meloland	3
Keyes	164		
El Centro	152	State total	5,146

Increase in Shipments from Imperial Valley, 1905-1915.

	Carloads		Carloads
1905	297	1911	2,580
1906	577	1912	2,887
1907	644	1913	3,502
1908	1,891	1914	4,448
1909	1,411	1915	4,722
1910	1,621		

The acreage in California in 1915 was estimated to be 11,674, and for the United States 41,981 acres. In watermelons California had 5,503 acres, and the United States 96,508 acres.

FRUIT CANNING AND PRESERVING, 1889-1909.

California made a pack of hermetically sealed fruits in tin cans in 1861. For many years after that canned goods were a luxury, relatively expensive, and used only in emergencies, on board ship or at remote places where other food was not obtainable.

The real importance and development of the canning industry did not commence until about the year 1875. The value of its products, which in 1889 was $6,621,931, more than doubled during each of the two following decades, amounting in 1909 to $32,914,829.

The case, which is used as the unit of measure for canned fruits and vegetables in the table below, consists of 24 standard-size cans No. 2 (also called 2-pound cans) for berries, cherries and plums, and No. 3 (also called 3-pound cans) for all fruits and vegetables.

California ranks first among the states in the production of canned apricots, peaches and pears, and of dried peaches and prunes; the state had a complete monopoly of the production of dried apricots and of raisins in the United States in 1909, neither of these being produced in any other state.

The most important of the dried fruit products, both in point of quantity and of value, were raisins and prunes. The fruit most largely canned in 1909 was peaches, the value of which constituted 9.2 per cent of the total for the canning and preserving industries.

CANNED FRUITS, 1899-1909.

(Compiled from the Census Reports.)

Product	1899		1904		1909	
	Cases	Value	Cases	Value	Cases	Value
Apples	25,287	$71,427	31,286	$67,591	67,710	$136,855
Apricots	531,568	1,582,927	532,038	1,619,757	627,701	1,819,558
Berries	87,564	218,733	67,467	168,640	95,092	171,995
Cherries	49,375	155,813	171,298	457,169	224,084	491,575
Peaches	903,676	3,103,775	744,715	2,640,524	1,149,590	3,013,203
Pears	444,343	1,610,900	524,197	1,577,823	433,796	1,316,022
Plums	358,298	596,484	196,379	349,307	138,995	230,384
All other	------------	------------	54,215	97,272	20,013	68,750
Totals	------------	$7,340,059	------------	$6,978,083	------------	$7,248,342

The leading varieties of fruits used for canning are as follows:

Apricots—
  Moorpark
  Hemskirke
  Blenheim
  Royal
Cherries—
  Royal Ann.
  Centennial
  Rockport
  Black Tartarian

Figs—
  Endish
Grapes—
  Muscat
Pears—
  Bartlett
Nectarines—
  Stanwich

Plums—
  Reine Claude
  Green Gage
  Washington
  Damson
  Jefferson
  Egg
  Golden Drop

Peaches—
  Clingstones:
    Philip
    Tuscan
    Golden Cling
  Freestones:
    Lovell
    Muir
    Crawford
    Foster

Fresno city is one of the principal centers of the canning and preserving industry of the state, in 1909 reporting nearly one-fourth of the total value of products for this industry in California and a much larger proportion of the total value of dried fruits.

CANNED FRUIT PACKED, BY VARIETIES, 1912-1916.

	1912*	1913*	1914*	1915*	1916*
Apples	80,250	31,535	93,410	81,620	213,525
Apricots	898,005	848,880	1,142,355	981,190	1,327,770
Blackberries	102,005	75,410	83,870	169,935	162,430
Cherries, Royal Ann	237,460	102,870	106,225	182,750	168,785
Cherries, black	56,720	27,740			
Cherries, white	57,715	32,055			
Currants	------------	------------	------------	------------	------------
Figs	------------	------------	------------	------------	------------
Gooseberries	------------	------------	------------	------------	------------
Grapes	47,185	41,665	49,685	77,610	101,130
Loganberries	21,380	15,735	15,900	38,559	57,390
Nectarines	------------	------------	------------	------------	------------
Pears	874,200	529,860	805,740	827,630	1,032,810
Peaches, free	583,800	768,750	888,125	831,875	1,202,940
Peaches, cling	1,680,255	1,629,800	2,621,655	2,407,650	2,597,390
Plums	175,290	65,975	110,440	95,215	84,750
Quinces	------------	------------	------------	------------	------------
Raspberries	9,090	5,590	4,470	5,060	18,440
Strawberries	34,470	9,255	18,135	10,637	14,040
Other fruits	26,075	9,405	28,865	21,435	40,535
No. 2½ pie fruits	------------	------------	------------	------------	------------
No. 8 pie fruits	------------	------------	------------	------------	------------
Jams and jellies	------------	------------	------------	------------	------------
Total fruits	4,883,900	4,194,525	5,968,875	5,731,166	7,021,975

*In 1912, 1913, 1914, 1915 and 1916 pie fruits were included with the respective varieties, thereby increasing quantities of same.

Figures on 1915 and 1916 pack are for 10-pound tins packed six tins per case. Figures for packs in previous years are for 10-pound tins packed twelve tins per case.

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Dried Fruits, 1899-1909.

(From the Census Reports.)

Dried fruits	1899		1904		1909	
	Pounds	Value	Pounds	Value	Pounds	Value
Apples	3,087,220	$155,893	811,254	$40,659	6,860,170	$481,173
Apricots	5,310,217	442,544	19,559,573	1,410,838	29,205,569	2,277,177
Peaches	5,502,390	301,495	25,845,364	1,701,105	46,827,391	2,422,043
Prunes	24,102,329	907,041	114,580,431	3,169,878	118,917,876	4,394,922
Raisins	10,734,221	720,268	121,409,881	6,349,381	111,774,767	4,837,933
All other	601,506	42,279	18,102,416	1,128,740	26,140,777	1,724,468
Totals	49,337,883	$2,569,520	300,308,919	$13,800,601	339,726,550	$16,137,716

Dried Fruit Packed, 1912-1916.

Varieties	Tons, 1912	Tons, 1913	Tons, 1914	Tons, 1915	Tons, 1916
Prunes	100,000	45,000	60,000	82,000	77,500
Raisins	92,500	65,000	91,000	128,000	132,000
Peaches	28,000	20,000	35,000	28,000	28,000
Apricots	19,000	9,000	20,000	16,000	10,900
Pears	5,000	2,000	4,000	1,000	1,000
Figs	4,500	3,500	5,000	7,000	6,700
Apples	3,500	2,500	5,000	4,000	4,500
Miscellaneous	1,000	2,000	5,000	1,000	1,000
Totals	253,500	149,000	224,000	267,000	261,600

The varieties of fruit cured by drying are as follows:

Apricots—
  Royal
  Blenheim
Figs—
  Adriatic
Peaches—
  Lovell
  Muir
  Crawford
  Foster
Nectarines—
  Stanwich
Pears—
  Bartlett
Plums—
  Washington
  Jefferson
  Egg
Prunes—
  Petites

Dried fruit is packed in boxes of 25 and 50 pounds, and 12½ kilos for abroad.

VARIETIES AND AVERAGE QUANTITY OF FRUIT USED IN CANNING.*

While there is a limited quantity of jams, jellies, and preserves manufactured commercially within the state, by far the larger quantity of fruit is used for canned fruit—that is, fruit that is filled into the can fresh, before cooking; sugar syrup is then put in merely for flavoring, the can is hermetically sealed and finally processed or sterilized by heat. Sugar is not essential to the keeping qualities. The preserves, jams and jellies stewed in kettles with a high percentage of sugar are not so dependent upon hermetic closure, as the sugar acts as a preservative agent. For these so-called preserves California produces suitable berries, sour cherries, peaches, plums, quinces, currants, gooseberries, apples and figs and grapes. But of greater commercial importance are the fruits that are generally used for tinned or canned fruits—apricots, peaches, pears, cherries and plums.

Apples. About 2,500 tons are canned annually in California, chiefly Newtown Pippins. The average price paid is from $10 to $12 per ton. The apples for canning purposes come largely from Sonoma, Santa Clara and Santa Cruz counties.

Apricots. In a normal season 20,000 tons of apricots are canned in California. The average price paid to growers for the past five years has been $30 per ton. The Royal Blenheim and Hemskirk varieties grown in Santa Clara Valley give the best results to the canner. Moorparks have a flavor preferred by many, and they grow to a large size.

Cherries. Royal Ann and White cherries in general are preferred. An average price would be from 5 to 6 cents per pound. About 1,200 tons of Royal Anns and Whites are used annually for canning, and probably 450 tons of Blacks.

Grapes. The Muscat or raisin grape is canned to a limited extent; about 1,000 tons are used annually at a price of about $12 to $15 per ton.

Nectarines. Nectarines are canned, but a very limited quantity is used, and the fresh and dried fruit markets are more desirable for this variety.

Peaches. The freestone varieties, such as the Muir and Lovell, are preferred. About 24,000 tons are canned annually with prices about $22.50 per ton for Lovell, and $17.50 for other varieties like the Muir and Early Crawford. In spite of the increased trouble and expense of removing the pit, Yellow Clings are the most desirable of all California canned fruits, and more of these are canned than any other variety. An average price delivered at the cannery would be about $25 per ton for Phillips and Tuscan, and $20 for other varieties. In the case of clings, a considerable demand has developed for slices. About 35,000 tons are used for canning.

Pears. About 20,000 tons of Bartlett pears are canned annually. The price paid to growers ranges from $30 to $40 per ton.

Plums. Egg plums, Green Gage, Golden Drop plums and similar varieties are used to a limited extent for canning. About 2,500 tons are used for canning, and the price is usually from $15 to $20 per ton.

Berries. Blackberries have been produced in large quantities, chiefly in Sonoma County, and are used extensively by canners. The Mammoth and Lawton varieties are most common. About 2,000 tons are used by canners and makers of preserves. The price has ranged about $40 per ton. Far better results are obtained from loganberries. In its fresh form the price ranges from $55 to $75 per ton. Canners use about 750 tons.

Strawberries. The varieties commonly grown are comparatively soft and juicy, suitable for jams and jellies, but not for preserves. Such are the Dollar and Jessie varieties of the Florin district near Sacramento, and the Banner and Malinda berries of the Watsonville district in Santa Cruz County. The Longworth of the Alviso and Santa Clara districts has become too small to give satisfaction to the canner. These varieties ordinarily bring $60 to $70 per ton, while the Clarke, Wilson and other similar varieties grown in Oregon bring $100 per ton. About

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*See address before the State Fruit Growers' Convention, Davis, June, 1914, by C. H. Bentley, Sales Manager, California Fruit Canners Association, San Francisco.

800 tons are used by canners and preservers, but a much larger quantity could be used of better varieties.

With raspberries, also, the canners find better results from Oregon fruit, because it is firmer and higher in color. The Cuthbert and Antwerp varieties are preferred for canning. Canners use about 100 tons.

Gooseberries are used in a limited way for jams and jellies.

Calimyrna and White Endish Figs are used to some extent. Texas seems to be able to grow a small white fig of good quality and this is canned to a considerable extent. There would seem to be an opportunity for development in California.

Damson Plums are needed for preserves, jams and jellies; they bring $35 to $40 per ton when ordinary varieties like the Gage and Egg Plums, are selling for $15. There are very few grown at the present time.

Concord Grapes are needed for jams and jellies; the want is partly filled by the Isabella variety.

Quinces, which were for years a drug on the fall fruit market, now bring $25 to $30 per ton.

Crabapples are in short supply, commanding a price of 4½ to 5 cents a pound.

Sour Cherries are also used in a limited way.

NUTS.

About three-fourths of the nuts produced in the United States are grown in California, walnuts and almonds being the principal crops.

Walnuts in the United States are produced almost exclusively in California, Orange and Los Angeles counties taking the lead.

California produces practically the whole of the almond crop in the United States.

Peanuts thrive well in southern California, chiefly on the lower lands of the coast region, while in central and northern California peanuts are mostly grown in the river bottoms of the Sacramento and San Joaquin valleys.

The pecans grow well in the lower lands of the interior valleys, but are raised in only limited quantities. The most favorable reports of pecan production on the Pacific Coast have come from the interior valleys of central and northern California. Very favorable reports have been received from small orchards and scattered trees (mainly seedlings) from Chico, Woodland, Winters, Vacaville, Elk Grove, Stockton, Farmington, Patterson, Fresno, and Bakersfield. Reports from Anaheim and Whittier, in southern California, where great trouble is experienced with pecan rosette, have been much less encouraging. In the opinion of one of the leading practical horticulturists of the San Joaquin Valley, the pecan offers greater inducements for that particular section than does the almond or the walnut (Persian).

Almonds.

The production of almonds in California in 1914 was 5,000,000 pounds, compared with 2,200,000 the previous year. In 1915 it amounted to 7,000,000 pounds. The crop for 1916 is estimated at 6,600,000 pounds and the quality was very good. California is the only state in the Union producing almonds commercially, and about 75 per cent of the crop is controlled by the California Almond Growers Exchange.

Grade	Price, cents, 1911	Price, cents, 1912	Price, cents, 1913	Price, cents, 1914	Price, cents, 1915	Price, cents, 1916
Nonpareil	16½	13	17½	18	13	17¼
I X L	15½	12¼	17	16½	12	14¾
Ne Plus Ultra	14½	11¼	16	15½	11	13¾
Drake Seedl'g	12	9¾	13	13	9¼	13
Hardshell	8	7	8½	8	7	8

Walnuts.

The acreage in walnuts in 1916 was estimated at 42,670 bearing and 16,000 nonbearing. During the last five years the crop has been as follows:

Year	Pounds
1912	22,024,000
1913	22,378,000
1914	17,778,000
1915	29,634,000
1916	27,410,000

The value of the walnut crop in 1916 amounted to $4,400,000.

New walnut producing areas are being developed, and very heavy plantings are being undertaken in several sections, in the San Joaquin Valley and other valleys in the state, and probably one-third of the plantings of the past season have been made north of the Tehachapi. Within the past year there have been at least 3,000 acres planted to walnuts in the San Fernando Valley.

The English walnut is the greatest nut grown in the state, judged by the size and value of the crop. It is almost entirely grown in the four southern counties of Santa Barbara, Los Angeles, Orange and Ventura.

The production of walnuts has doubled in the last ten years, until the domestic supply produces half the quantity consumed in the United States.

The bulk of imported nuts are of the Marbot and Cornes varieties, which correspond in size and quality to the second grade of the Pacific Coast production. There are about four million pounds of Naples walnuts imported from Italy annually, and these are the greatest competitors of the California product, as they are of high quality and bring a high price on the market. The total quantity of walnuts imported in 1916 was 36,858,934 pounds, valued at $5,056,945.

The price for the last four years is as follows:

Grade	Price per pound, 1913 (cents)	Price per pound, 1914 (cents)	Price per pound, 1915† (cents)	Price per pound, 1916 (cents)
No. 1 softshells	16	16½	13½	15½
Fancy budded	19	20	17	19
No. 2	11	12	10½	12½
Jumbos	17½	*18½	16½	17½

*Later reduced to 17 cents.

†Later the price on Fancy was advanced to 17½ and on No. 1 Softshell to 14.

Chestnuts.

The Spanish or sweet chestnut is a stately and magnificent tree, native of the countries bordering on the Mediterranean, but also ripening as far north as Scotland. This nut can be grown very successfully in the coast counties, where the conditions are exceptionally favorable for them. Of chestnuts grown in California the Italian predominates, and it may be said that a large area of the state is well suited for the growth of this nut, as there are bearing trees in nearly all parts of the state. The chestnut, aside from its desirability as an orchard tree, can be commended as a tree for hillsides or a shade tree, and should be more widely planted in California.

The chestnut is an important crop in Italy, where the yield was 696,244 tons in 1916, and it is considered an important crop, as it forms one of the chief foodstuffs of the poor. Chestnuts also bulk largely in the food resources of the poor in Spain, Switzerland and Germany. Chestnuts are eaten raw or roasted, or else ground into flour. The quantity imported into this country can not be stated, as in the customs returns they are not given separately, but included under ''all other nuts.''

The Pistachio Nut.

This nut is a native of Syria, and is generally cultivated in the Mediterranean region. Investigations are being made by the United States Department of Agriculture which may lead to a new nut industry in California; it was introduced a number of years ago, but no results have been reported. There should be a great future for the pistachio nut, particularly in the interior valleys. It is from this nut that the most expensive candy is manufactured.

PRINCIPAL ORCHARD FRUITS BY COUNTIES.

Best Location for the Leading Fruit Crops.

The following summary is both interesting and valuable, as the figures show which districts are the best for raising the different varieties of fruit. In the earlier years many failures were experienced by growers, owing to the soil or climate not being suitable for the trees they had planted.

According to the number of trees in bearing, the following six counties rank in the order named in the production of various fruits:

Apples.

County	Number of bearing trees	County	Number of bearing trees
Santa Cruz	647,136	Santa Clara	102,841
Sonoma	386,740	Los Angeles	101,433
Monterey	290,404	Humboldt	73,010

Apricots.

Santa Clara	783,585	Ventura	219,836
Solano	310,262	Fresno	186,823
Alameda	270,461	Yolo	117,228

Cherries.

Santa Clara	173,002	Sonoma	43,927
Alameda	89,284	Placer	31,209
Solano	53,923	San Joaquin	21,590

Peaches and Nectarines.

Fresno	2,277,314	Placer	683,824
Kings	777,697	Santa Clara	437,677
Tulare	714,494	Solano	341,266

Pears.*

Solano	182,194	Santa Clara	142,550
Sacramento	161,094	Sonoma	109,965
Placer	142,999	Alameda	70,382

Prunes and Plums.

Santa Clara	3,387,455	Placer	279,766
Sonoma	569,232	Tulare	264,337
Napa	299,613	Sacramento	206,553

*Owing to the ravages of the pear blight, the number of bearing trees decreased from 2,512,890 in 1900 to 1,410,905 in 1910.

Total Number of Bearing Orchard Trees.

The following twelve counties have the largest number of orchard fruit trees in bearing, in the order named:

County	Number of bearing trees	County	Number of bearing trees
Santa Clara	5,043.766	Kings	1,048,506
Fresno	2,579.859	Santa Cruz	875,642
Sonoma	1,364,105	Alameda	627,824
Solano	1,357,911	Sacramento	506.961
Placer	1,190,074	Napa	497,391
Tulare	1,059,830	Butte	452,302

TROPICAL FRUITS.

Figs.

County	Number of bearing trees	County	Number of bearing trees
Fresno	120,124	Yolo	10,476
Stanislaus	37,676	Merced	9,837
Tulare	15,750	Butte	9,518

Olives.

San Diego	109,871	Butte	73,453
Los Angeles	84,934	Fresno	72,788
Riverside	80,572	Orange	67,046

Lemons.

Los Angeles	219,149	Riverside	115,020
San Diego	195,318	Ventura	95,018
San Bernardino	157,731	Orange	46,954

Oranges.

San Bernardino	1,951,254	Tulare	801,151
Los Angeles	1,674,695	Orange	478,272
Riverside	1,021,957	Butte	147,412

Pomeloes.

San Bernardino	13,134	San Diego	5,764
Tulare	8,114	Riverside	4,477
Los Angeles	6,853	Yolo	1,325

Total Number of Bearing Trees of Tropical Fruit.

San Bernardino	2,153,501	Ventura	253,754
Riverside	1,224,217	Butte	235,442
Los Angeles	1,194,402	Santa Barbara	99,023
Tulare	872,657	Sacramento	84,863
San Diego	425,260	Kern	82,888
Fresno	291,754	Placer	59,906

GRAPEVINES.

County	Number of bearing vines	County	Number of bearing vines
Fresno	*†40,687,207	Santa Barbara	†5,987,127
Sonoma	†17,939,972	Santa Clara	†5,584,480
San Joaquin	†13,371,794	Los Angeles	*†4,923,877
Napa	†8,595,338	Kings	*†4,538,732
Sacramento	†7,627,510	Contra Costa	†2,972,130
Tulare	*†7,227,491	Yolo	*†2,568,019

*Raisin grapes. †Wine grapes. All produce table grapes.

NUTS.

Almonds.

County	Number of bearing trees	County	Number of bearing trees
Contra Costa	209,056	Butte	84,069
Yolo	149,019	Los Angeles	76,949
Solano	98,276	Sacramento	66,372
San Joaquin	97,024	Sutter	61,572

Walnuts.

Los Angeles	281,837	Santa Barbara	96,776
Orange	276,842	Santa Clara	19,070
Ventura	98,622	Sonoma	11,955

Pecans.

San Diego	1,080	Los Angeles	313
Napa	996	Ventura	301
Kern	563	Santa Clara	136

Total Nut Trees in Bearing.

Los Angeles	359,349	Solano	100,239
Orange	278,879	San Joaquin	99,499
Contra Costa	215,249	Santa Barbara	97,091
Yolo	150,822	Sacramento	67,156
Ventura	110,984	Sutter	62,289

SMALL FRUITS.

Strawberries.

County	Number of acres	County	Number of acres
Los Angeles	1,380	Placer	433
Santa Cruz	489	Monterey	263
Santa Clara	460	Fresno	148
Sacramento	450	Sonoma	103

Blackberries.

Sonoma	930	Fresno	91
Los Angeles	280	Tulare	70
Santa Clara	228	San Bernardino	68
Santa Cruz	116	Placer	62

Total Small Fruits.

County	Number of bearing trees	County	Number of bearing trees
Los Angeles	1,975	Monterey	407
Sonoma	1,471	Alameda	401
Santa Clara	1,011	Fresno	310
Santa Cruz	744	Orange	205
Placer	582	Stanislaus	161
Sacramento	554	Butte	148

CALIFORNIA CROPS COMPARED WITH OTHER STATES.

The following summary proves that California holds a leading position in the production of a number of the principal crops of fruits and nuts in the United States, and also among others, of barley, beans, and sugar beets. The three leading states are here given from the census reports on the basis of value. When less than three states are named, others do not produce that particular crop:

California Crops Compared With Other States.

Crop	Acreage	Production	Value
Almonds—			
California		6,692,513 pounds	$700,304
Avocados (Alligator pears)—			
Florida		4,920 crates	10,100
Apricots—			
California		4,066,823 bushels	2,768,921
Barley—			
Minnesota	1,573,761	34,927,773 bushels	17,213,817
California	1,195,158	26,441,954 bushels	17,184,568
Wisconsin	816,449	22,156,041 bushels	12,682,136
Beans (dry edible)—			
Michigan	403,669	5,282,511 bushels	9,716,315
California	157,987	3,328,218 bushels	6,295,457
New York	115,698	1,681,506 bushels	3,689,064
Beets (sugar)—			
Colorado	108,082	1,231,712 tons	6,061,152
California	78,957	845,191 tons	4,320,532
Michigan	78,779	707,639 tons	4,014,123
Blackberries and dewberries—			
Missouri	5,975	6,391,209 quarts	456,283
New Jersey	4,332	5,456,789 quarts	313.480
California	2,576	4,898,524 quarts	282,383
Cherries—			
California		501,013 bushels	951,624
Pennsylvania		475,093 bushels	909,975
Ohio		338,644 bushels	657,406
Currants—			
New York	2,557	3,982,389 quarts	264,051
Michigan	609	768,259 quarts	58,288
California	407	852,378 quarts	43,508
Dates—			
California		3,332 pounds	418
Arizona		6,500 pounds	96
Figs—			
California		22,990,353 pounds	260,153
Mississippi		1,949,301 pounds	107,609
Texas		2,411,876 pounds	97,078
Grapefruit (pomeloes)—			
Florida		1,061,537 boxes	1,907,816
California		122,515 boxes	143,180
Grapes—			
California		1,979,686,525 pounds	10,846,812
New York		253,006,361 pounds	3,961,677
Guavas—			
Florida		258,709 pounds	7,604
California		95,053 pounds	4,018
Hemp—			
Kentucky	6,855	6,420,232 pounds	348,386
California	300	600,000 pounds	39,000
Indiana	335	395,467 pounds	21,755
Hops—			
Oregon	21,770	16,582,562 pounds	2,838,860
New York	12,023	8,677,138 pounds	2,597,981
California	8,391	11,994,953 pounds	1,731,110
Lemons—			
California		2,756,221 boxes	2,976,571

California Crops Compared With Other States—Continued.

Crop	Acreage	Production	Value
Limes—			
Florida		11,302 boxes	$12,457
Loquats—			
California		4,516 boxes	5,830
Mandarins—			
Louisiana		3,340 boxes	5,945
California		555 boxes	607
Mangoes—			
Florida		5,278 boxes	5,739
Mustard seed—			
California	1,964	3,168,270 pounds	100,731
Nursery products—			
New York	6,680		2,750,957
California	4,803		2,212,788
Texas	3,847		1,253,110
Nuts (all)—			
California		28,378,115 pounds	2,959,845
Texas		5,945,932 pounds	562,542
Pennsylvania		3,795,804 pounds	90,447
Olives—			
California		16,132,412 pounds	401,277
Oranges—			
California		14,436,180 boxes	12,951,505
Florida		4,852,967 boxes	4,304,987
Peaches and nectarines—			
California		9,267,118 bushels	4,573,775
Georgia		2,555,499 bushels	2,182,613
Arkansas		1,901,647 bushels	1,502,996
Pears—			
California		1,928,097 bushels	1,660,963
New York		1,343,089 bushels	1,418,218
Michigan		666,023 bushels	535,771
Persimmons (Japanese)—			
California		2,696 bushels	3,344
Texas		1,175 bushels	2,136
Florida		1,615 bushels	2,066
Pineapples—			
Florida		778,644 crates	734,069
Plums and prunes—			
California		9,317,979 bushels	5,473,539
Oregon		1,747,587 bushels	838,783
Washington		1,032,077 bushels	600,503
Pomegranates—			
California		30,075 pounds	968
Georgia		27,365 pounds	920
Nevada		45,550 pounds	915
Seed (flower and vegetable)—			
California			594,724
Illinois			194,626
New York			72,991
Strawberries—			
New York	6,382	15,945,863 quarts	1,187,410
California	4,585	15,694,326 quarts	1,149,475
Missouri	9,048	15,171,034 quarts	1,122,784
Sunflower seed—			
Illinois	3,969	49,004 bushels	44,539
California	257	6,855 bushels	6,264
Indiana	430	6,330 bushels	5,894
Tangerines—			
Florida		34,871 boxes	64,082
California		3,581 boxes	4,188
Walnuts (Persian or English)—			
California		21,432,266 pounds	2,247,193

In Kafir corn and milo maize, California ranks fourth, Texas, Kansas, and Oklahoma taking the lead. In quinces California also takes the fourth place, New York, Pennsylvania, and Ohio leading. In raspberries and loganberries, New York, Michigan, and Ohio take the first three places, with California fourth and Washington fifth. In other crops, the first place is held by the following states: Apples, New York; broomcorn, Oklahoma; buckwheat, New York; chicory, Michigan; corn, Illinois; cotton and cottonseed, Texas; cranberries, Massachusetts; emmer and spelt, South Dakota; flaxseed, North Dakota; flowers and plants, New York; gooseberries, Illinois; hay and forage, New York; maple syrup, Ohio; maple sugar, Vermont; mint, Michigan; oats, Illinois; peanuts, North Carolina; peas (dry), Wisconsin; pecans, Texas; potatoes, New York; rice, Louisiana; rye, Michigan; seed (grass), Iowa; sorghum cane, Kentucky; sugar cane, Louisiana; sweet potatoes and yams, Georgia; tobacco, Kentucky; vegetables (other than potatoes, sweet potatoes and yams), New York; wheat, North Dakota.

IMPORTS AND EXPORTS OF FRUITS AND NUTS, 1913-16.*

Imports.

The following is a summary of the imports and exports during the last four years, which reflect the effect on commerce of the war in Europe:

Bananas Imported, 1913-16.

Year	Bunches	Value
1913	46,057,509	$15,393,672
1914	46,640,243	15,863,972
1915	38,230,310	12,687,696
1916	35,385,291	12,189,682

Imported principally from Central American states, British Honduras, and the British West Indies, and also from Cuba.

Currants Imported, 1913-16.

Year	Pounds	Value
1913	30,924,305	$1,195,330
1914	32,130,575	1,244,752
1915	25,240,218	1,246.491
1916	16,055,623	1,382,157

Currants are imported almost exclusively from Greece.

Dates Imported, 1913-16.

Year	Pounds	Value
1913	40,261,910	$775,920
1914	25,786,468	431,401
1915	26,453,118	431,591
1916	16,918,824	449,729

Dates are mostly imported from Turkey in Asia.

Figs Imported, 1913-16.

Year	Pounds	Value
1913	19,162,494	$948,460
1914	20.506.563	968.448
1915	8,327,870	390,327
1916	15,754,672	673,134

The largest quantity of figs is imported from Turkey in Asia, and the rest mostly from Greece and Portugal. In 1916 most of the figs came from Portugal, about one-half, or 8,105,000 pounds, arriving in December. The United States is about the only market still open to these figs, the greater part of which were shipped in former years to Germany and Russia, via Holland.

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*These figures are for the calendar year ending December 31; those in the summary from 1906 to 1916, pages 163-172, are for the fiscal year ending June 30, therefore the totals are not the same.

Grapes Imported 1913-16.

Year	Cubic feet	Value
1913	1,332,170	$1,594,526
1914	1,330,087	1,545,526
1915	625,364	703,560
1916	1,382,032	1,634,495

(100 cubic feet equals one ton of 2,240 pounds.)

These (mostly Almeria grapes) are imported almost entirely from Spain.

Lemons Imported, 1913-16.

Year	Value
1913	$6,413,847
1914	5,227,845
1915	2,266,907
1916	2,451,538

Lemons are imported almost entirely from Italy.

Olives Imported, 1913-16.

Year	Gallons	Value
1913	3,517,899	$1,589,090
1914	5,743,130	2,528,390
1915	3,713,315	1,551,152
1916	6,672,683	2,742,684

Most imported olives come from Spain, but a considerable quantity also come from Greece.

Olive Oil (edible) Imported, 1913-16.

Year	Gallons	Value
1913	5,179,209	$6,776,842
1914	6,780,936	8,421,499
1915	6,368,872	8,105,834
1916	7,382,353	10,407,608

More than two-thirds of the olive oil imported comes from Italy; France and Spain supply smaller quantities.

Oranges Imported, 1913-16.

Year	Value
1913	$253,284
1914	52,860
1915	78,586
1916	63,347

The bulk of the oranges imported come from Jamaica; Italy and Mexico also supply a smaller quantity.

Pineapples Imported, 1913-16.

Year	Value
1913	$1,325,974
1914	1,355,123
1915	1,175,883
1916	916,371

Most of the pineapples come from Cuba.

Raisins Imported, 1913-16.

Year	Pounds	Value
1913	3,564,298	$288,338
1914	3,873,784	267,329
1915	1,604,803	167,516
1916	1,757,560	229,351

Raisins are imported almost exclusively from Spain, but Sultanas, or Seedless, are imported from Smyrna, in Turkey in Asia.

Preserved Fruits Imported, 1913-16.

Year	Value
1913	$901,064
1914	1,096,259
1915	891,087
1916	890,391

Preserved fruits come principally from France, but Italy also sends a considerable amount.

All Other Fruits Imported, 1913-16.

Year	Value
1913	$1,420,887
1914	1,653,106
1915	1,355,982
1916	1,910,703

Total Value of Fruits Imported, 1913-16.

Year	Value
1913	$32,100,392
1914	32,235,011
1915	23,046,778
1916	25,533,582

Nuts Imported, 1913-16.

Year	Value
1913	$16,704,156
1914	17,537,036
1915	17,380,245
1916	26,950,840

Under this heading are included almonds, cocoanuts (in shell and copra), cream and Brazil nuts, filberts, peanuts and walnuts. About two-thirds of the nuts come from France, but Italy also supplies a considerable quantity.

Total Value of Fruits and Nuts Imported, 1913-16.

Year	Value
1913	$48,804,548
1914	49,772,047
1915	40,427,023
1916	52,484,422

EXPORTS OF DOMESTIC FRUITS AND NUTS, 1913-16.

Dried Apricots Exported, 1913-16.

Year	Pounds	Value
1913	21,325,523	$2,308,779
1914	16,541,222	1,598,405
1915	25,748,426	2,323,075
1916	13,564,447	1,512,810

Of apricots in 1915, 7,062,000 pounds went to the United Kingdom, 2,937,000 pounds to France, 2,043,000 pounds to the Netherlands, and 13,704,000 pounds to other countries. In 1916, 4,001,037 pounds went to France, 1,423,216 pounds to the Netherlands, 1,401,297 to the United Kingdom, and the balance to other countries.

Dried Apples Exported, 1913-16.

Year	Pounds	Value
1913	38,734,465	$2,719,203
1914	31,027,551	2,441,094
1915	33,908,508	2,671,601
1916	13,186,467	1,002,007

Of dried apples in 1915, the Netherlands took 4,238,000 pounds, and the balance of 29,666,000 pounds went to other countries; in 1916 Sweden took 4,306,385 pounds, the Netherlands 1,462,154 pounds, and the balance to other countries.

Apples (green or ripe) Exported, 1913-16.

Year	Barrels	Value
1913	1,920,221	$7,417,400
1914	1,541,361	5,695,621
1915	2,176,992	7,686,284
1916	1,670,543	7,205,766

Of these in 1915, 1,492,000 barrels were exported to the United Kingdom, 365,000 barrels to Canada, 50,000 barrels to Argentina, and 268,000 barrels to other countries; in 1916, 1,119,354 barrels went to the United Kingdom, 287,937 to Canada, 54,543 to Argentina, and the balance to other countries.

Lemons Exported, 1913-16.

Year	Boxes	Value
1913	58,428	$353,083
1914	94,317	351,897
1915	160,397	417,539
1916	163,667	563,539

The bulk of the lemons are exported to Canada, Australia and the Philippine Islands.

Oranges Exported, 1913-16.

Year	Boxes	Value
1913	905,942	$2,674,834
1914	1,839,862	4,225,991
1915	1,588,718	3,586,831
1916	1,782,081	4,229,872

Of oranges in 1915, Canada took 3,332,000 boxes, the United Kingdom 112,957 boxes, and the balance of 141,000 went to other countries; in 1916, 1,672,766 were taken by Canada, 27,672 by the United Kingdom, and the balance by other countries.

Dried Peaches Exported, 1913-16.

Year	Pounds	Value
1913	5,152,147	$341,215
1914	7,387,161	458,983
1915	18,660,272	1,120,534
1916	9,678,083	644,980

The United Kingdom, Canada and Denmark take most of the dried peaches.

Pears (green or ripe) Exported, 1913-16.

Year	Value
1914	$926,958
1915	716,837
1916	1,239,567

The largest quantity of pears is taken by the United Kingdom and Canada.

Dried Prunes Exported, 1913-16.

Year	Pounds	Value
1913	94,344,157	$5,551,208
1914	35,228,737	2,582,560
1915	50,976,789	3,593,059
1916	54,339,218	4,036,836

Prunes are exported to many countries. In 1915 the United Kingdom took 15,677,000 pounds, Canada 10,941,000 pounds, France, 1,885,000 pounds, other European countries 18,572,000 pounds, and all other countries 3,897,000 pounds. In 1916 France took 12,106,000 pounds, Canada 10,490,000 pounds, the United Kingdom 6,988,000 pounds, and the balance went to other countries, mostly in Europe.

Raisins Exported, 1913-16.

Year	Pounds	Value
1913	16,594,394	$1,606,509
1914	21,688,429	1,485,417
1915	58,585,261	4,240,160
1916	57,499,903	4,491,371

Raisins show a larger increase than any other fruit, while the imports have steadily and greatly fallen off. In exports Canada is much the largest customer, followed by New Zealand and England. The rest is taken by a number of foreign countries, all over the world, in various quantities under one million pounds.

Canned or Preserved Fruits Exported, 1913-16.

Year	Value
1913	$5,256,617
1914	5,553,918
1915	6,605,350
1916	5,856,366

Of these the United Kingdom in 1915 took canned fruits of the value of $5,265,000, Canada $180,670, and other countries $1,159,000. In 1916 the United Kingdom took canned fruits to the value of $3,458,523, Canada $574,349, and other countries $1,823,494. The total value of all fruits exported, including green or ripe pears valued at $716,000, berries, $448,000, all other green, ripe or dried fruit not specified, $2,844,000, and all other preserved fruits of the value of $672,000 was as follows:

Total Value of All Fruits Exported, 1913-16.

Year	Value
1913	$32,913,445
1914	28,868,839
1915	36,926,567
1916	36,001,814

Total Value of All Nuts Exported, 1913-16.

Year	Peanuts	All other	Total
1913	$391,508	$403,742	$795,250
1914	378,793	287,871	666,664
1915	330,004	492,087	822,129
1916	929,360	415,897	1,345,257

The total value of all fruits and nuts exported during the above three years was in 1913, $33,708,695; in 1914, $29,535,503; and in 1915, $37,748,658, and in 1916, $37,347,071.

CALIFORNIA FRUIT AND NUT CROPS.

1896–1916.

Apples, Apricots, Figs, Oranges, Lemons, Olives, Nectarines, Pears, Peaches, Prunes, Plums, Raisins, Dried Grapes, and Greek Currants, Canned Fruits, Nuts, Also Imports and Exports for the Fiscal Year Ending June 30.

APPLES (DRIED), 1896-1916.

(None imported.)

Year	California crop, pounds	Exported	
		Pounds	Value
1896	2,350,000	26,691,963	1,340,507
1897	5,250,000	30,775,401	1,340,159
1898	3,520,000	31,031,254	1,897,725
1899	5,900,000	19,305,739	1,245,733
1900	6,360,000	34,964,010	2,247,851
1901	6,450,000	28,309,023	1,510,581
1902	9,750,000	15,664,468	1,190,593
1903	3,600,000	39,646,297	2,378,635
1904	3,000,000	48,301,665	2,791,421
1905	6,500,000	39,272,890	2,208,414
1906	5,500,000	27,852,831	2,044,820
1907	3,600,000	45,697,948	3,166,946
1908	6,800,000	24,237,873	1,946,810
1909	5,800,000	33,474,634	2,339,936
1910	6,200,000	25,076,618	2,056,692
1911	9,000,000	21,804,086	1,944,209
1912	6,500,000	53,664,639	4,545,971
1913	3,600,000	41,574,562	2,898,211
1914	8,000,000	33,563,160	2,628,445
1915	8,000,000	42,589,169	3,270,658
1916	9,000,000	16,219,174	1,304,224

Dried Apples Exported in 1915 and 1916.

Country	1915		1916	
	Pounds	Value	Pounds	Value
Denmark	17,820,846	$1,363,829	2,316,126	$210,046
Sweden	10,748,504	845,041	6,859,064	584,186
Netherlands	5,200,178	430,181	1,878,251	147,590
United Kingdom	5,098,725	338,981	1,163,641	82,747

APRICOTS (DRIED), 1896-1916.

(None imported.)

Year	California crop, pounds	Exported	
		Pounds	Value
1896	6,740,000		
1897	30,125,000		
1898	8,240,000		
1899	11,600,000		
1900	28,080,000		
1901	15,750,000		
1902	37,525,000	1,928,367	$178,143
1903	21,000,000	9,190,081	713,887
1904	17,000,000	7,205,686	608,511
1905	38,500,000	6,854,154	606,777
1906	6,500,000	13,760,281	1,325,422
1907	3,000,000	2,760,432	336,812
1908	36,000,000	1,224,602	229,467
1909	32,000,000	16,597,871	1,512,417
1910	33,500,000	12,028,834	1,218,423
1911	14,000,000	19,329,358	2,085,437
1912	35,500,000	13,413,430	1,885,855
1913	18,000,000	35,016,730	3,513,473
1914	40,000,000	17,401,692	1,937,771
1915	32,000,000	23,764,342	2,241,061
1916	20,000,000	23,939,790	2,168,808

Dried Apricots Exported in 1915 and 1916.

Country	1915		1916	
	Quantity	Value	Quantity	Value
United Kingdom	9,017,358	$452,456	5,783,717	$518,596
Denmark	4,314,206	382,427	3,655,775	342,284
Sweden	2,048,027	184,188	4,336,878	371,035
France	1,911,296	192,781	2,570,491	234,971
Netherlands	1,285,632	133,359	2,526,953	254,673

FIGS, 1896-1916.

(Duty, 2 cents per pound.)

Year	California crop, pounds	Imported	
		Pounds	Value
1896	2,160,000	11,900,710	$639,512
1897	3,250,000	8,940,762	535,380
1898	4,780,000	9,628,426	509,002
1899	5,800,000	7,284,058	356,762
1900	4,000,000	8,812,487	513,895
1901	6,500,000	9,933,871	458,513
1902	7,250,000	11,087,131	487,733
1903	6,000,000	16,482,142	775,917
1904	5,700,000	13,178,061	660,360
1905	7,250,000	13,364,107	617,027
1906	7,750,000	17,562,358	722,967
1907	6,000,000	24,346,173	1,136,924
1908	6,000,000	18,836,574	867,523
1909	7,500,000	15,235,513	691,981
1910	6,250,000	17,362,197	775,319
1911	8,000,000	23,459,728	1,059,340
1912	10,000,000	18,765,408	934,763
1913	11,100,000	16,837,819	944,317
1914	10,000,000	19,284,868	941,207
1915	15,000,000	20,779,730	1,024,495
1916	13,400,000	7,153,250	315,831

Nearly all the figs are imported from Smyrna, in Turkey in Asia, about two million pounds from Greece and smaller quantities from Italy and Spain. In 1916 a considerable quantity were imported from Portugal.

Exports of domestic figs are not shown separately in the customs returns, but are included in "All other green, ripe, or dried fruits."

OLIVES, 1907-1916.

(Duty, 15 cents per gallon.)

Year	Imported	
	Gallons	Value
1907	2,298,480	$1,277,973
1908	3,121,788	1,358,897
1909	2,969,329	1,349,023
1910	4,555,975	1,659,801
1911	3,044,947	1,567,546
1912	5,076,857	2,303,277
1913	3,946,076	1,896,982
1914	5,316,364	2,292,837
1915	3,622,275	1,607,903
1916	5,938,446	2,433,304

NOTE.—Olives in California, although cultivated on a considerable scale, have generally been considered one of the minor crops, and no regular records of the crop have been kept until the last few years. A large acreage has been planted in the last two or three years. Previous to 1907 the imports of olive oil were not given separately in the customs returns.

Most of the olives imported into this country come from Italy; France ranking second.

Exports of domestic olives and olive oil are not shown separately in the customs returns, but included in "All other fruits, or oils."

OLIVE OIL, 1896-1916.

Imports.

(Duty, in cask, 20 cents per gallon; in bottles, 30 cents per gallon. Olive oil unfit for food, free.)

Year	For manufacturing or mechanical purposes		For table use	
	Gallons	Value	Gallons	Value
1896	*	*	942,598	†$1,107,049
1897	*	*	928,567	†1,134,077
1898	*	*	736,877	†923,804
1899	*	*	930,042	†1,090,250
1900	*	*	967,702	†1,170,871
1901	*	*	983,059	†1,266,293
1902	*	*	1,339,097	†1,579,409
1903	*	*	1,494,132	†1,736,648
1904	*	*	1,713,590	†1,875,825
1905	*	*	1,923,174	†2,108,893
1906	2,538,366	$1,105,876	2,447,131	2,566,994
1907	1,471,766	682,656	3,449,517	3,523,725
1908	1,565,253	703,829	3,799,112	3,876,901
1909	369,979	183,983	4,129,454	5,069,655
1910	842,926	477,679	3,702,210	4,869,114
1911	578,477	378,819	4,405,827	6,014,191
1912	636,013	389,539	4,836,515	6,170,882
1913	619,356	407,074	5,221,001	6,739,172
1914	763,924	477,210	6,217,560	7,916,980
1915	653,064	450,001	6,710,967	8,225,485
1916	884,944	684,896	7,224,431	9,746,672

NOTE.—No record has been kept of the annual output of California olive oil until recently, although the amount has been considerable for some years.

*Included in "Olive oil for table use."

†1885-1905 includes olive oil for manufacturing purposes.

CALIFORNIA ORANGE AND LEMON CROP, 1896-1916.

(Carloads.)

Season	Southern California		Total carloads	Northern and Central California*		Grand total, carloads
	Lemons	Oranges		Oranges	Lemons	
1895–96	565	7,010	7,575			
1896–97	1,378	5,972	7,350			
1897–98	1,166	13,987	15,153			
1898–99	903	9,448	10,351			
1899–1900	1,447	16,362	17,809			
1900–01	2,924	21,173	24,097			
1901–02	2,816	17,571	20,387			
1902–03	2,649	19,776	22,425	†1,304		23,729
1903–04	2,782	25,117	27,899	†1,567		29,466
1904–05	4,274	25,608	29,882	†1,734		31,616
1905–06	3,789	22,175	25,964	†1,564		27,528
1906–07	3,507	23,986	27,493	†2,333		29,826
1907–08	4,959	24,538	29,497	†3,150		32,647
1908–09	6,196	31,875	38,071	†2,501		40,572
1909–10	4,782	25,331	30,113	2,921	109	33,143
1910–11	6,764	36,821	43,585	2,687	127	46,399
1911–12	5,961	30,327	36,288	4,220	172	40,680
1912–13	2,192	13,574	15,766	2,453	112	18,331
1913–14	2,954	39,024	41,978	6,282	78	48,338
1914–15	6,843	33,317	40,160	6,427	225	46,812
1915–16	7,016	31,871	38,887	6,026	170	45,083

*Lemons and oranges not reported prior to 1902-03 and not shown separately until 1909. The number of boxes per car of oranges and lemons has varied considerably, as the size of cars in recent years has increased. In 1904-05, and prior to that date, oranges averaged about 374 boxes and lemons 313 boxes to the car. At the present time the numbers are about 396 for oranges and 336 for lemons.

†Including lemons.

Imports and Exports of Oranges, 1896-1916.

(Duty, in packages exceeding 5 cubic feet, or in bulk, ½ of 1 cent per pound.)

Year	Exports		Imports	
	Boxes	Value	Pounds	Value
1896				$2,694,131
1897				2,324,907
1898		$339,396		886,722
1899		282,313		1,097,596
1900		271,468	68,618,938	1,087,041
1901		436,560	50,332,914	716,457
1902		420,835	52,742,476	784,640
1903		465,397	56,872,070	818,780
1904		739,593	35,896,260	525,468
1905		929,151	28,880,575	374,088
1906		1,110,993	31,134,341	456,726
1907		1,255,104	21,267,346	354,495
1908	654,251	1,577,661	18,397,429	275,060
1909	866,753	2,131,724	8,435,873	137,390
1910	932,118	2,213,905	4,676,118	82,457
1911	1,179,273	2,983,322	7,672,186	116,658
1912	1,197,363	3,022,859	7,628,662	108,880
1913	1,063,233	2,976,520	12,252,960	233,760
1914	1,558,921	3,824,889	*	93,472
1915	1,759,405	3,851,013	*	50,022
1916	1,575,042	3,690,080	*	89,464

NOTE.—In years for which no figures are given, oranges were included in "Other fresh or dried fruits." Oranges are mostly imported from Mexico, West Indies, and Italy. The bulk of California oranges exported go to Canada.

*Quantity of oranges and lemons imported not given since 1913.

Imports and Exports of Lemons, 1896-1916.

(Duty, in packages exceeding 5 cubic feet, or in bulk, ½ cent per pound.)

Year	Imported		Exported	
	Pounds	Value	Boxes	Value
1906	138,717,252	$2,933,990	-----------	-----------
1907	157,859,906	4,253,296	-----------	-----------
1908	178,490,003	4,388,530	-----------	-----------
1909	135,183,550	2,623,399	-----------	-----------
1910	160,214,785	3,136,933	-----------	-----------
1911	134,968,924	2,985,561	-----------	-----------
1912	145,639,396	3,368,863	-----------	-----------
1913	151,416,412	4,300,266	81,949	$399,409
1914	*	5,981,635	70,075	308,707
1915	*	3,730,075	122,914	372,781
1916	-----------	2,062,030	175,070	493,919

NOTE.—Of the imported lemons in 1912, 145,275,122 pounds came from Italy, and the balance of 364,274 from other countries. The exports of domestic lemons were not shown separately in the customs returns until 1913, but were included under "All other" fruit.

*The quantity is not stated after 1913.

PEACHES AND NECTARINES (DRIED) EXPORTED, 1896-1916.

(None imported.)

Year	California crop, pounds			Exported	
	Peaches	Nectarines	Total	Pounds	Value
1896	16,460,000	625,000	17,085,000	-----------	-----------
1897	27,150,000	285,000	27,435,000	-----------	-----------
1898	10,960,000	190,000	11,150,000	-----------	-----------
1899	34,800,000	840,000	35,640,000	-----------	-----------
1900	34,340,000	870,000	35,210,000	-----------	-----------
1901	29,510,000	650,000	30,160,000	-----------	-----------
1902	50,420,000	910,000	51,330,000	-----------	-----------
1903	36,000,000	635,000	36,635,000	-----------	-----------
1904	23,000,000	420,000	23,420,000	-----------	-----------
1905	35,000,000	370,000	35,370,000	-----------	-----------
1906	22,500,000	340,000	22,840,000	1,181,649	$110,407
1907	24,000,000	275,000	24,275,000	1,757,650	186,043
1908	48,000,000	525,000	48,525,000	1,148,598	144,318
1909	40,000,000	750,000	40,750,000	2,403,430	151,334
1910	50,000,000	500,000	50,500,000	2,617,069	151,520
1911	22,000,000	800,000	22,800,000	7,125,014	499,530
1912	53,000,000	500,000	53,500,000	4,425,803	422,766
1913	40,000,000	400,000	40,400,000	6,529,633	444,879
1914	69,400,000	600,000	70,000,000	6,712,296	449,549
1915	57,000,000	400,000	57,400,000	14,464,655	834,813
1916	56,000,000		-----------	13,739,342	893,587

NOTE.—Included in "All other green, ripe, or dried fruits" in the years where no figures are given.

PEARS EXPORTED, 1896-1916.

(None imported.)

Year	California crop, dried pears, pounds	Exported green or ripe, value	Year	California crop, dried pears, pounds	Exported green or ripe, value
1896	3,650,000		1907	1,000,000	$675,944
1897	6,350,000		1908	5,000,000	288,918
1898	6,620,000		1909	2,500,000	546,198
1899	5,760,000		1910	2,000,000	302,958
1900	14,550,000		1911	4,000,000	578,067
1901	6,510,000		1912	3,500,000	784.627
1902	5,250,000		1913	2,000,000	796,913
1903	4,650,000		1914	3,000,000	1,402,924
1904	3,500,000		1915	2,000,000	992,497
1905	3,500,000		1916	1,600,000	691,732
1906	7,000,000	631,972			

NOTE.—Included under "All other green, ripe, or dried fruit" in the years where no figures are given. Dried pears are not shown separately. Pears are mostly exported to the United Kingdom and Canada.

DRIED PRUNES, 1896-1916.

(Duty, 1 cent per pound.)

Year	California crop, pounds	Exports		Year	California crop, pounds	Exports	
		Pounds	Value			Pounds	Value
1896	55,200,000			1907	105,000,000	44,400,104	$2,400,960
1897	97,780,000			1908	57,000,000	28,148,450	1,642,114
1898	90,420,000	15,940,791	$1,021,888	1909	150,000,000	22,602,288	1,078,210
1899	112,900,000	5,615,565	380,847	1910	75,000,000	89,014,880	4,016,554
1900	174,000,000	25,922,371	1,646,332	1911	140,000,000	51,030,711	3,271,971
1901	81,600,000	10,021,564	589,113	1912	200,000,000	74,328,074	4,969,053
1902	195,000,000	23,358,849	1,404,422	1913	90,000,000	117,950,875	6,655,870
1903	165,000,000	66,385,215	3,512,507	1914	120,000,000	69,813,711	4,662,546
1904	135,000,000	73,146,214	3,410,497	1915	174,000,000	43,478,892	3,274,197
1905	70,000,000	54,993,849	2,455,056	1916	130,000,000	57,422,827	3,975,396
1906	180,000,000	24,869,744	1,410,636				

The largest quantity of prunes exported go to Germany and Canada; the imports of prunes are included with plums.

PLUMS, 1896-1916.

(Duty, 1 cent per pound.)

Year	California plum crop, pounds	Imports of plums and prunes		Year	California plum crop, pounds	Imports of plums and prunes	
		Pounds	Value			Pounds	Value
1896	2,100,000	483,658	$68,862	1907	1,500,000	323,377	$45,386
1897	3,250,000	710,028	73,303	1908	1,000,000	335,089	49,322
1898	2,460.000	303,992	39.660	1909	1,200,000	296,123	41,696
1899	3.360,000	600,360	63,574	1910	750,000	*	*
1900	3,900,000	443,457	47,700	1911	1,200,000	*	*
1901	3,450,000	745.974	62,880	1912	750.000	*	*
1902	2,560,000	522,478	44,077	1913	1,200,000	*	*
1903	2,870,000	633,819	63,218	1914	1,500,000	*	*
1904	2,300,000	494,105	46,976	1915	1,900,000	*	*
1905	1.860,000	671,604	63,617	1916	1,200,000	*	*
1906	2,000,000	497,494	53,348				

*Included in "All other fruits" after 1909, the quantity being so small.

CALIFORNIA RAISIN CROP, AND EXPORTS AND IMPORTS, 1896-1916.

(Duty on raisins and dried grapes, 2 cents per pound.)

Year	California crop, pounds	Exports		Imports	
		Pounds	Value	Pounds	Value
1896	68,000,000			10,826,094	$460,200
1897	[illegible]			12,650,598	567,039
1898	[illegible]	3,109,639	$167,062	6,593,833	381,889
1899	71,000,000	4,559,807	242,620	[illegible]	282,400
1900	[illegible]	2,215,456	[illegible]	10,399,498	531,124
1901	74,000,000	3,312,364	[illegible]	3,860,836	297,631
1902	105,000,000	[illegible]	[illegible]	[illegible]	399,973
1903	[illegible]	4,280,028	284,530	[illegible]	476,844
1904	[illegible]	[illegible]	281,402	6,867,617	355,542
1905	[illegible]	[illegible]	372,057	4,041,689	273,031
1906	[illegible]	4,528,502	305,768	12,414,855	524,590
1907	[illegible]	8,125,827	[illegible]	3,967,151	364,403
1908	[illegible]	[illegible]	[illegible]	[illegible]	554,633
1909	[illegible]	[illegible]	455,657	5,794,320	327,644
1910	[illegible]	[illegible]	[illegible]	[illegible]	296,047
1911	[illegible]	[illegible]	[illegible]	2,479,220	237,422
1912	[illegible]	[illegible]	[illegible]	[illegible]	295,466
1913	[illegible]	[illegible]	[illegible]	2,579,705	241,630
1914	[illegible]	14,766,416	[illegible]	4,554,549	309,511
1915	256,000,000	24,845,414	1,718,547	2,808,806	238,958
1916	264,000,000	75,014,753	5,407,219	1,024,296	143,750

NOTE.—Imported raisins come almost entirely from Spain, and Sultanas, which are included in the above figures from Smyrna in Turkey in Asia. These latter have also greatly decreased in recent years from upward of 7,000,000 pounds in 1906 to about 500,000 pounds, but in 1913 the quantity increased to 1,287,296 pounds, and 2,730,338 pounds in 1914. Canada is our best customer for raisins, taking 18,000,000 pounds in 1913 and 10,000,000 in 1914.

DRIED GRAPES.

The quantity of "dried grapes" (which are wine grapes) is now small, and is discouraged, as they make inferior raisins.

IMPORTS OF GREEK CURRANTS, 1896-1916.

(Duty, 1½ cents per pound.)

Year	Pounds	Value	Year	Pounds	Value
1896*	33,040,846	$551,072	1907	38,392,779	$1,746,941
1897	29,265,761	596,084	1908	38,652,656	1,592,018
1898	25,186,210	837,987	1909	32,482,111	1,185,106
1899	30,849,253	798,357	1910	33,326,030	1,190,020
1900	36,251,779	916,908	1911	33,439,565	1,486,263
1901	16,049,198	916,994	1912	33,151,396	1,561,350
1902	36,238,976	[illegible]	1913	30,843,735	1,306,410
1903	33,878,209	[illegible]	1914	32,033,177	1,233,228
1904	38,347,649	[illegible]	1915	30,350,527	1,209,273
1905	31,742,919	[illegible]	1916	25,373,029	1,382,839
1906	37,078,311	[illegible]			

*From 1891 to 1894, currants were duty free, and in 1895, 1896 and 1897, currants not from Zante were admitted free. Currants practically all come from Greece.

CALIFORNIA CANNED FRUIT, AND EXPORTS, 1896-1916.

(None imported.)

Year	California pack, cases	Exports, Value	Year	California pack, cases	Exports, Value
1896	1,602,446	$1,376,281	1907	2,983,000	$1,581,047
1897	1,942,982	1,686,723	1908	4,734,000	1,549,826
1898	2,085,166	1,624,741	1909	3,047,000	2,899,374
1899	3,003,100	2,330,715	1910	3,600,000	2,656,019
1900	2,775,800	3,127,278	1911	4,095,035	2,686,445
1901	2,677,000	3,006,109	1912	4,883,900	4,012,463
1902	2,252,000	1,195,635	1913	4,194,525	5,599,373
1903	2,783,500	1,739,571	1914*	5,968,875	4,863,946
1904	2,840,600	2,637,002	1915	5,731,166	6,064,765
1905	3,252,500	2,541,025	1916	7,021,975	7,050,061
1906	3,125,000	2,348,064			

*Exported domestic canned fruit in 1914, to the United Kingdom, $3,182,051; to all other countries, $1,681,895.

IMPORTS OF MISCELLANEOUS FRUITS, 1896-1916.

Duty on Imported Preserved Fruits.

Preserved in sugar of their own juices, 1 cent a pound; if contained over 10 per cent of alcohol, 20 per cent ad valorem and in addition $2.50 per proof gallon of alcohol in excess of 10 per cent. Jellies, 20 per cent ad valorem; pineapples preserved in their own juice, 20 per cent ad valorem.

Year	Prepared or preserved fruits, value	All other fresh or dried fruits, value	Total fruits, value	Year	Prepared or preserved fruits, value	All other fresh or dried fruits, value	Total fruits, value
1896	$598,928	$2,128,056	$16,957,307	1907	$1,272,445	$1,363,167	$26,124,277
1897	605,053	1,810,807	14,926,771	1908	1,550,246	2,250,815	27,710,799
1898	922,357	1,294,855	12,329,012	1909	1,062,775	1,912,949	22,446,430
1899	1,020,644	1,579,652	15,586,664	1910	956,368	920,362	24,177,160
1900	1,243,479	1,989,546	16,284,758	1911	893,633	971,572	27,017,632
1901	1,366,801	2,059,130	16,317,848	1912	936,008	1,693,516	29,549,281
1902	1,454,788	2,053,588	17,436,184	1913	795,399	1,115,330	28,657,084
1903	1,521,443	2,353,864	18,860,238	1914	1,111,193	1,710,009	2,821,202
1904	1,796,209	2,749,670	18,964,688	1915	1,022,968	1,431,242	2,454,210
1905	1,599,488	2,924,187	19,779,113	1916	954,510	1,582,600	2,537,110
1906	2,437,766	2,484,345	21,542,322				

EXPORTS OF MISCELLANEOUS DOMESTIC FRUITS (RIPE OR DRIED) 1896-1916.

Year	Preserved other than canned (value)	Other fresh or dried fruits (value)	Total fruits (value)	Year	Preserved other than canned (value)	Other fresh or dried fruits (value)	Total fruits (value)
1896	$70,353	$1,868,353	$5,585,783	1907	$104,663	$2,246,384	$17,206,267
1897	43,276	2,172,199	7,613,500	1908	137,929	2,360,360	13,965,840
1898	82,504	2,033,845	8,851,787	1909	77,746	2,104,624	16,079,227
1899	66,899	1,997,649	7,757,235	1910	176,474	2,119,210	18,504,591
1900	63,448	2,545,451	11,486,172	1911	205,643	2,792,281	23,893,663
1901	71,597	2,716,269	10,607,908	1912	136,870	3,812,304	30,354,700
1902	94,323	2,153,050	8,415,103	1913	181,749	2,893,395	36,345,517
1903	66,757	4,215,034	17,558,119	1914	224,841	2,922,740	3,147,581
1904	115,490	4,317,910	20,348,299	1915	269,180	2,717,449	2,986,629
1905	71,868	2,253,638	15,297,391	1916	978,568	3,261,109	4,239,677
1906	89,872	1,727,943	14,857,272				

ALMONDS, 1896-1916.

(Duty, 3 cents per pound; shelled, 4 cents per pound.)

Year	California crop, pounds	Imported		Year	California crop, pounds	Imported	
		Pounds	Value			Pounds	Value
1896	3,210,000	7,789,681	$763,594	1907	1,850,000	14,233,613	$2,331,816
1897	4,750,000	9,644,338	880,263	1908	6,000,000	17,144,968	2,410,648
1898	900,000	5,746,362	659,659	1909	3,500,000	11,029,421	1,852,523
1899	4,640,000	9,957,427	1,222,587	1910	6,800,000	18,556,356	3,153,645
1900	5,480,000	6,317,633	949,083	1911	3,400,000	15,552,712	2,896,573
1901	3,000,000	5,140,232	946,138	1912	6,000,000	17,231,458	3,253,495
1902	6,540,000	9,868,982	1,240,886	1913	2,200,000	15,670,558	3,344,658
1903	6,400,000	8,142,164	1,337,717	1914*	5,000,000	19,038,405	4,679,289
1904	1,600,000	9,838,852	1,246,474	1915*	7,000,000	17.111,264	3,599,579
1905	4,250,000	11,745,081	1,520,063	1916*	6,600,000	16,596,921	3,973,113
1906	1,800,000	15,009,326	1,825,475				

*Of the above quantity imported in 1914, 13,307,631 pounds were shelled and 5,730,774 pounds unshelled; in 1915, 12,208,551 shelled and 4,902,713 were not shelled; in 1916, 13,667,766 shelled, and 2,929,155 not shelled.

Practically all almonds are imported from Spain, Italy and France.

WALNUTS, 1896-1916.

(Duty on imported walnuts, unshelled, 2 cents per pound; shelled, 4 cents.)

Year	California crop, pounds	Imported	
		Pounds	Value
1896	8,230,000	----------	----------
1897	7,970,000	----------	----------
1898	11,300,000	----------	----------
1899	11,160,000	----------	----------
1900	10,860,000	----------	----------
1901	13,800,000	----------	----------
1902	17,140,000	----------	----------
1903	11,000,000	12,362,567	$1,106,033
1904	15,180,000	23,670,761	1,729,378
1905	11,500,000	21,684,104	1,469,463
1906	12,250,000	24,917,028	2,193,653
1907	14,000,000	32,597,592	2,969,649
1908	18,000,000	28,887,110	2,765,486
1909	17,000,000	26,157,703	2,409,644
1910	15,000,000	33,641,466	3,538,264
1911	22,000,000	33,619,434	4,471,227
1912	22,024,000	37,213,674	4,069,515
1913	22,378,354	26,662,441	3,499,981
1914*	17,778,000	37,195,728	4,339,481
1915*	29,634,000	33,445,838	3,984,227
1916*	27,410,000	36,858,934	5,056,945

Years for which no figures are given are included in "Other nuts."

*Of the above number imported in 1914, 28,267.699 pounds were unshelled, and 8,928,029 shelled, and in 1915 22,338.348 pounds unshelled, and 11,107.490 pounds shelled. In 1916, 14,228,714 pounds were shelled, and 22,630.220 not shelled.

IMPORTED NUTS, 1896-1916.

(Duty on imported peanuts, unshelled, ⅜ of 1 per cent per pound; shelled, ¾ of 1 per cent per pound; all others (except almonds, peanuts and walnuts) 1 cent per pound.)

Year	Peanuts and other ground nuts		Miscellaneous nuts, value	Total value, all nuts*
	Pounds	Value		
1896			$868,799	$2,075,132
1897			848,511	2,200,161
1898			1,002,344	2,237,938
1899			879,166	2,727,542
1900			1,326,804	2,978,834
1901			1,518,484	3,268,855
1902			1,971,072	4,044,341
1903			1,514,406	4,866,398
1904			1,523,462	5,471,166
1905			2,082,344	6,158,343
1906			2,055,557	7,373,425
1907			2,100,274	9,742,883
1908			1,790,375	9,643,943
1909			1,717,374	8,664,253
1910	29,276,235	$1,234,088	1,218,052	13,246,742
1911	18,834,441	765,033	1,254,943	14,498,413
1912	15,558,038	575,282	858,837	15,827,988
1913	18,756,422	769,666	977,161	13,965,569
1914	44,549,789	1,899,237	1,357,520	19,782,924
1915	24,184,673	824,759	884,850	16,819,799
1916	28,413,680	1,051,038	1,989,262	21,160,491

*Including cocoanuts, cream and Brazil nuts, and filberts.

In 1913 the unshelled peanuts imported amounted to 12,281,580 pounds, and the shelled to 6,801,415 pounds; in 1914 the unshelled 17,472,631, and the shelled 27,077,158; in 1916, 9,020,848 were not shelled, and 19,392,832 shelled.

EXPORTS OF DOMESTIC NUTS, 1896-1916.

Year	Peanuts		All other nuts, value	Total value, all nuts
	Pounds	Value		
1896				$93,283
1897				125,805
1898				161,432
1899				140,250
1900				156,490
1901				218,743
1902				304,241
1903				299,558
1904				330,366
1905				309,195
1906*	7,180,163	$275,927	$140,959	416,886
1907	6,386,012	278,236	103,929	382,165
1908	5,503,685	283,819	89,205	373,024
1909	5,501,107	242,569	246,284	488,853
1910	4,484,613	224,779	156,284	381,063
1911	5,447,185	276,651	328,151	604,802
1912	5,920,711	305,465	303,473	608,938
1913	7,301,381	366,016	367,569	733,585
1914	8,054,817	421,367	398,312	819,679
1915	5,875,076	325,725	377,486	703,211
1916	8,669,430	450,765	441,512	892,277

*Prior to 1906 peanuts were not shown separately in the customs returns.

TABLE XXIX.

ORCHARD FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.
(Compiled from the Census Reports.)

Counties	Apples		Apricots		Cherries	
	Number of trees	Bushels	Number of trees	Bushels	Number of trees	Bushels
Alameda	26,045	38,346	270,461	399,035	89,284	89,662
Alpine	1,140	642	7		63	2
Amador	8,592	11,990	1,197	949	1,143	1,588
Butte	34,425	42,671	9,900	11,126	4,317	4,403
Calaveras	13,341	21,583	672	465	459	329
Colusa	3,067	4,507	4,420	3,323	223	228
Contra Costa	13,429	18,494	38,812	19,906	7,258	5,139
Del Norte	3,234	3,110			48	38
El Dorado	31,929	26,529	503	786	3,259	3,051
Fresno	32,097	34,505	186,823	206,536	2,729	104
Glenn	4,617	4,909	6,830	2,310	78	48
Humboldt	73,010	1,552,585	235	267	3,733	5,040
Imperial	86	3	1,922	673		
Inyo	19,611	35,430	342	416	539	331
Kern	7,725	10,006	33,573	48,955	163	64
Kings	4,196	8,507	124,007	234,147	11	205
Lake	22,254	18,537	1,463	536	590	764
Lassen	12,679	10,349	70	17	439	61
Los Angeles	101,433	118,528	122,769	181,079	795	168
Madera	20,576	11,227	9,408	6,188	40	20
Marin	15,995	6,907	1,689	633	165	111
Mariposa	16,001	29,141	233	415	120	216
Mendocino	63,263	112,856	187	305	1,181	1,576
Merced	8,941	7,267	7,381	4,263	343	64
Modoc	28,969	60,202	652	788	963	1,033
Mono	1,088	850	6	1	197	190
Monterey	290,404	501,847	27,996	36,067	1,729	723
Napa	41,301	47,216	16,953	16,273	16,955	20,895
Nevada	20,223	25,800	193	133	1,727	1,810
Orange	11,992	12,218	129,352	328,931	23	9
Placer	42,704	26,848	4,092	1,023	31,209	67,429
Plumas	3,534	1,391	18		65	10
Riverside	10,577	9,977	83,069	145,159	982	765
Sacramento	10,948	18,235	10,480	9,951	17,173	33,729
San Benito	26,593	31,385	61,694	106,806	3,421	1,761
San Bernardino	55,150	79,077	111,125	171,763	3,057	2,928
San Diego	37,662	45,687	20,858	33,001	1,792	1,729
San Francisco	40	230				
San Joaquin	5,053	7,019	53,007	27,474	21,590	13,669
San Luis Obispo	35,006	56,047	20,123	25,929	702	463
San Mateo	18,634	31,317	3,694	1,259	671	228
Santa Barbara	2,744	38,511	15,512	29,237	659	238
Santa Clara	102,841	118,603	783,585	958,163	173,002	90,198
Santa Cruz	647,136	2,090,968	63,021	95,042	17,608	25,368
Shasta	35,440	47,556	839	2,141	2,785	2,311
Sierra	3,398	4,895			67	114
Siskiyou	31,055	19,521	366	363	1,850	1,478
Solano	4,862	6,857	310,262	180,011	53,923	52,512
Sonoma	386,740	818,725	9,087	10,374	43,927	58,710
Stanislaus	3,680	1,693	20,451	14,122	1,182	380
Sutter	5,433	7,806	5,986	3,443	1,249	967
Tehama	15,633	16,256	30,446	26,128	624	321
Trinity	4,272	4,951	41	33	247	205
Tulare	25,261	28,241	48,834	56,042	316	290
Tuolumne	13,544	16,558	162	120	144	118
Ventura	15,179	19,170	219,836	562,978	392	1,047
Yolo	2,512	3,654	117,228	101,396	4,534	5,908
Yuba	5,468	7,133	1,481	342	559	265
Totals	2,482,762	6,335,073	2,992,453	4,066,823	522,304	501,013

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*For the number of bearing trees in orchard fruits in 1890 and 1900, see Report for 1912, pages 162-164.

TABLE XXIX—Continued.

ORCHARD FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.
(Compiled from the Census Reports.)

Counties	Peaches and nectarines		Pears	
	Number of trees	Bushels	Number of trees	Bushels
Alameda	12,555	14,561	70,382	99,994
Alpine	28	40	79	36
Amador	16,349	20,606	5,112	4,430
Butte	255,047	356,683	22,159	25,318
Calaveras	5,954	6,794	2,178	5,358
Colusa	4,075	3,372	2,432	1,906
Contra Costa	39,461	38,525	68,088	75,803
Del Norte	42	32	129	154
El Dorado	61,800	58,738	49,672	36,848
Fresno	2,277,314	2,727,978	13,356	7,548
Glenn	6,420	3,175	1,655	1,500
Humboldt	9,171	10,552	3,804	8,196
Imperial	432	228	347	11
Inyo	4,602	5,037	2,668	2,676
Kern	35,149	30,278	1,057	1,065
Kings	777,697	803,637	4,379	8,007
Lake	9,288	8,336	39,075	39,871
Lassen	1,455	1,753	632	479
Los Angeles	160,197	234,581	16,149	21,161
Madera	40,989	20,996	1,185	1,164
Marin	6,313	3,092	4,151	8,979
Mariposa	1,618	1,803	701	1,528
Mendocino	6,928	10,031	15,829	23,666
Merced	134,991	90,954	5,704	2,624
Modoc	2,113	1,866	1,888	3,334
Mono	91	61	123	122
Monterey	7,381	8,693	5,194	8,061
Napa	71,080	65,843	50,210	81,812
Nevada	17,873	22,488	36,800	26,279
Orange	12,461	13,104	2,100	2,973
Placer	683,824	1,084,566	142,999	115,950
Plumas	184	35	261	112
Riverside	72,933	77,138	18,447	13,424
Sacramento	99,635	129,981	161,094	308,352
San Benito	12,301	25,132	12,409	22,903
San Bernardino	197,763	246,049	2,302	3,421
San Diego	29,800	29,530	6,023	7,585
San Francisco	120	125	-----------	-----------
San Joaquin	185,073	229,175	13,664	13,096
San Luis Obispo	10,614	10,325	5,097	8,869
San Mateo	572	643	1,688	1,923
Santa Barbara	9,560	11,337	2,612	5,148
Santa Clara	437,677	574,514	142,550	206,214
Santa Cruz	11,868	10,873	23,100	33,456
Shasta	98,950	110,712	33,952	64,803
Sierra	157	83	148	414
Siskiyou	4,371	3,779	2,300	2,164
Solano	341,266	474,444	182,194	319,303
Sonoma	237,220	165,396	109,965	128,421
Stanislaus	154,553	89,385	4,158	1,804
Sutter	149,057	287,894	17,911	32,754
Tehama	260,204	276,049	141,584	26,992
Trinity	886	873	738	1,468
Tulare	714,494	622,373	6,483	4,948
Tuolumne	3,065	2,063	1,056	2,004
Ventura	8,943	15,630	2,597	3,776
Yolo	116,003	219,660	38,115	71,897
Yuba	8,744	5,517	10,220	25,993
Totals	7,829,011	9,267,118	1,410,905	1,928,097

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*For the number of bearing trees in orchard fruits in 1899 and 1900, see Report for 1912, pages 162-164.

TABLE XXIX—Continued.

ORCHARD FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.
(Compiled from the Census Reports.)

Counties	Plums and prunes		Total	
	Number of trees	Bushels	Number of trees	Bushels
Alameda	157,981	157,270	627,824	799,976
Alpine	214	42	1,531	762
Amador	10,685	11,880	43,332	51,757
Butte	104,474	252,141	452,302	693,210
Calaveras	8,265	9,901	31,276	44,963
Colusa	57,468	111,658	71,796	125,122
Contra Costa	58,177	54,831	225,939	213,351
Del Norte	96	222	3,549	3,556
El Dorado	32,764	23,327	180,017	149,543
Fresno	66,926	139,252	2,579,859	3,116,325
Glenn	24,860	8,559	44,565	20,613
Humboldt	26,950	12,161	117,368	1,589,053
Imperial	347	3	3,170	926
Inyo	2,349	1,845	30,164	45,760
Kern	58,075	74,053	136,088	164,626
Kings	132,192	258,851	1,048,506	1,315,117
Lake	47,244	54,807	120,037	122,945
Lassen	2,223	1,069	17,511	13,731
Los Angeles	43,592	34,295	446,698	590,929
Madera	7,570	435	80,156	40,077
Marin	3,775	2,625	32,263	22,420
Mariposa	762	1,168	19,461	34,283
Mendocino	37,197	63,356	125,282	212,320
Merced	5,401	3,437	163,013	108,843
Modoc	3,182	4,660	37,776	71,883
Mono	86	10	1,595	1,234
Monterey	6.189	4,122	339,105	559,680
Napa	299,613	407,023	497,391	639,976
Nevada	6,955	7,055	84,259	84,046
Orange	4,569	5,295	160,667	362,981
Placer	279,766	323,731	1,190,074	1,673,123
Plumas	510	161	4,574	1,709
Riverside	34,357	54,873	220,723	301,493
Sacramento	206,553	269,547	506,961	772,257
San Benito	91,066	223,443	207,537	411,477
San Bernardino	8,779	6,473	379,533	509,989
San Diego	16,022	8,204	112,993	126,427
San Francisco	945	575	1,105	930
San Joaquin	83,641	102,991	364,290	395,038
San Luis Obispo	21,383	15,236	93,217	117,126
San Mateo	18,279	14,686	43,655	50,130
Santa Barbara	2,730	4,822	34,200	89,858
Santa Clara	3,387,455	3,854,070	5,043,766	5,807,595
Santa Cruz	112,269	109,959	875,642	2,366.344
Shasta	87,959	159,696	262,136	387,566
Sierra	232	262	4,002	5,768
Siskiyou	5,683	4,405	45,708	31,735
Solano	465,341	714,730	1,357,911	1,747,916
Sonoma	569,232	596,953	1,364,105	1,784,301
Stanislaus	6,095	3,492	190,515	111,304
Sutter	65,723	136,082	244,587	469,829
Tehama	92,459	133,024	441,070	478,915
Trinity	1,083	1,329	7,313	8,906
Tulare	264,337	639,586	1,059,830	1,351,573
Tuolumne	1,404	1,302	19,554	22,254
Ventura	12,541	15,755	259,682	618,490
Yolo	119,193	214,792	397,748	617,448
Yuba	3,487	2,447	30,264	41,998
Totals	7,168,705	9,317,979	22,485,195	31,501,507

*For the number of bearing trees in orchard fruits in 1890 and 1900, see Report for 1912, pages 162-164.

TABLE XXX.

TROPICAL FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.

(Compiled from the Census Reports.)

Counties	Figs		Olives		Lemons	
	Number of trees	Pounds	Number of trees	Pounds	Number of trees	Boxes
Alameda	482	9,990	10,963	45,285	660	2,144
Alpine	----------	----------	4	50	----------	----------
Amador	347	24,315	274	2,600	8	12
Butte	9,518	337,725	73,453	2,242,445	2,223	1,222
Calaveras	1,839	142,990	4,065	10,465	19	37
Colusa	1,391	60,577	336	5,716	199	148
Contra Costa	293	16,235	9,744	340,410	148	92
Del Norte	1	----------	----------	----------	----------	----------
El Dorado	587	74,060	37	4,020	----------	----------
Fresno	120,124	15,898,146	72,788	655,302	12,389	10,083
Glenn	879	63,235	445	14,290	593	432
Humboldt	82	2,430	----------	----------	----------	----------
Imperial	606	10,450	41	----------	36	4
Inyo	14	400	----------	----------	----------	----------
Kern	1,475	92,990	393	2,950	54	37
Kings	391	26,720	5	400	----------	----------
Lake	1,062	41,896	3,198	7,390	8	----------
Lassen	----------	----------	----------	----------	----------	----------
Los Angeles	5,736	397,376	84,934	1,549,419	219,149	704,301
Madera	4,321	82,290	18,010	38,035	15	16
Marin	201	1,065	48	150	26	25
Mariposa	461	135,455	2,711	2,452	35	50
Mendocino	358	25,125	7	100	----------	----------
Merced	9,837	793,495	6,981	90,916	209	217
Modoc	----------	----------	----------	----------	----------	----------
Mono	----------	----------	----------	----------	----------	----------
Monterey	217	9,146	657	2,622	7	----------
Napa	1,234	20,889	20,176	36,885	258	86
Nevada	1,468	67,225	419	4,273	6	----------
Orange	1,066	25,123	67,046	828,204	46,954	74,227
Placer	4,463	105,802	26,396	417,415	714	683
Plumas	6	----------	6	----------	----------	----------
Riverside	2,054	73,796	80,572	1,281,970	115,020	304,683
Sacramento	1,145	54,450	34,077	969,962	2,500	1,636
San Benito	128	4,615	4	----------	5	4
San Bernardino	1,144	33,790	30,190	486,478	157,731	630,108
San Diego	2,459	94,323	109,871	2,559,792	195,318	473,543
San Francisco	----------	----------	1	----------	----------	----------
San Joaquin	4,037	232,063	19,998	506,268	75	58
San Luis Obispo	819	43,317	1,597	28,877	955	1,475
San Mateo	36	525	7,187	141,006	1	1
Santa Barbara	858	40,255	44,258	1,275,022	46,181	134,168
Santa Clara	985	31,500	13,945	639,227	996	1,201
Santa Cruz	333	12,845	1,243	2,500	349	233
Shasta	2,306	53,270	9,616	7,541	7	1
Sierra	----------	----------	----------	----------	----------	----------
Siskiyou	3	10	----------	----------	2	----------
Solano	4,598	497,159	1,221	34,874	126	163
Sonoma	3,850	98,105	10,863	54,490	396	235
Stanislaus	37,676	397.675	5,458	129,384	576	262
Sutter	4,675	447,470	3,018	170,581	602	641
Tehama	3,176	115,472	17,373	394,449	356	354
Trinity	20	255	----------	----------	2	----------
Tulare	15,750	1,037,350	5,605	89,921	41,069	65,466
Tuolumne	237	17,435	10	----------	6	----------
Ventura	618	29,653	25,961	686,171	95,018	347,804
Yolo	10,476	1,128,670	4,482	307,395	183	222
Yuba	3,159	81,200	6,660	64,710	109	147
Totals	269,001	22,990,353	836,347	16,132,412	941,293	2,756,221

*For the number of bearing trees of tropical fruits in 1890 and 1900, see Report for 1912, pages 165-167.

NOTE.—The production of most fruits being in pounds and citrus fruits in boxes, the total production for each county can not be given.

TABLE XXX—Continued.

TROPICAL FRUITS BY COUNTIES.*

Number of Bearing Trees in 1910, and Production.
(Compiled from the Census Reports.)

Counties	Oranges		Pomeloes		Total trees
	Number of trees	Boxes	Number of trees	Boxes	
Alameda	3,782	6,074	4	2	15,900
Alpine	----	----	----	----	4
Amador	151	283	----	----	780
Butte	147,412	128,108	122	171	235,442
Calaveras	388	544	3	2	6,315
Colusa	1,537	2,970	70	147	3,537
Contra Costa	402	453	----	----	10,597
Del Norte	----	----	----	----	1
El Dorado	53	195	----	----	677
Fresno	85,781	92,640	346	431	291,754
Glenn	4,860	1,704	5	13	6,783
Humboldt	1	----	----	----	83
Imperial	1,410	3,012	18	1	2,411
Inyo	----	----	----	----	14
Kern	80,940	32,232	16	7	82,888
Kings	24	31	----	----	425
Lake	72	13	----	----	4,340
Lassen	----	----	----	----	----
Los Angeles	1,674,695	4,124,161	6,853	11,810	1,994,402
Madera	184	114	2	----	22,532
Marin	79	147	5	9	387
Mariposa	1,169	1,691	1	1	4,378
Mendocino	4	3	----	----	370
Merced	1,572	1,097	11	2	18,613
Modoc	----	----	----	----	----
Mono	----	----	----	----	----
Monterey	29	25	----	----	913
Napa	1,192	535	9	21	23,251
Nevada	364	320	2	----	2,311
Orange	478,272	1,247,905	677	2,612	597,383
Placer	26,921	14,103	289	411	59,906
Plumas	----	----	----	----	12
Riverside	1,021,957	2,006,902	4,477	16,408	1,224,217
Sacramento	46,256	61,517	864	1,278	84,863
San Benito	42	10	----	----	179
San Bernardino	1,951,254	5,425,759	13,134	60,149	2,153,501
San Diego	107,457	167,201	5,764	12,950	425,260
San Francisco	----	----	----	----	1
San Joaquin	1,950	1,854	2	----	26,070
San Luis Obispo	794	1,225	75	49	4,253
San Mateo	25	9	----	----	7,249
Santa Barbara	4,246	12,272	716	931	99,023
Santa Clara	1,905	1,354	57	9	18,023
Santa Cruz	330	151	7	6	2,279
Shasta	55	39	----	----	11,986
Sierra	----	----	----	----	----
Siskiyou	----	----	----	----	6
Solano	2,950	2,737	15	----	8,911
Sonoma	5,047	4,209	8	4	20,226
Stanislaus	10,492	8,087	18	1	54,291
Sutter	2,427	3,335	18	14	10,741
Tehama	10,744	7,975	5	4	31,654
Trinity	----	----	----	----	22
Tulare	801,151	758,465	8,114	13,551	872,657
Tuolumne	114	122	----	----	367
Ventura	131,681	310,239	392	909	253,754
Yolo	2,371	2,949	1,325	612	18,858
Yuba	1,263	1,409	----	----	11,205
Totals	6,615,805	14,436,180	43,424	122,515	8,726,005

NOTE.—The production of most fruits being in pounds and citrus fruits in boxes, the total production for each county can not be given.

TABLE

GRAPES AND NU

Number of Vines and Bearin

(Compiled from t

Counties	Grapes		Almonds	
	Number of vines bearing	Production, pounds	Number of trees	Pounds
Alameda	2,390,959	20,671,600	21,190	155,871
Alpine	9,000	56,000	12	75
Amador	314,604	2,743,320	628	3,931
Butte	258,742	1,499,000	84,069	799,351
Calaveras	212,300	1,457,030	14,624	27,080
Colusa	482,417	5,010,240	16,078	90,479
Contra Costa	2,972,130	32,217,131	209,056	830,112
Del Norte	----------	----------	----------	----------
El Dorado	581,342	4,891,740	438	3.850
Fresno	40,687,207	611,253,961	7,390	56,472
Glenn	20,416	145,300	25,739	61,055
Humboldt	4,095	76,405	304	580
Imperial	298,813	1,210,475	29	----------
Inyo	39,478	292,730	28	1,080
Kern	419,582	1,715,540	3,101	23,505
Kings	4,538,732	91,434,166	1,721	37,040
Lake	296,752	1,750,522	8,281	47.316
Lassen	31	800	8	----------
Los Angeles	4,923,877	44,846,307	76,949	57,770
Madera	1,530,630	21,105,970	2,778	7,975
Marin	115,198	1,982,560	151	1,112
Mariposa	28,647	285,740	159	1,918
Mendocino	924,191	6,471,050	229	4,260
Merced	1,281,342	12,085,751	17,132	114,499
Modoc	795	7,100	----------	----------
Mono	2,000	20,000	----------	----------
Monterey	79,935	754,340	2,196	24,050
Napa	8,595,338	66,876,897	18.731	90,783
Nevada	94,338	757,865	1,325	11,980
Orange	282,682	2,684,855	1,248	70
Placer	1,340,132	11,231,830	11,539	64,431
Plumas	----------	----------	----------	----------
Riverside	1,570,794	12,133,389	21,789	168,570
Sacramento	7,627,510	399,386,705	66,372	335,257
San Benito	177,976	1,620,030	6,958	73,922
San Bernardino	5,987,127	38,608,263	634	15,479
San Diego	1,228,858	15,204,430	9.279	40,521
San Francisco	3,000	10,000	----------	----------
San Joaquin	13,371,794	175,879,915	97.024	547,300
San Luis Obispo	265,481	1,937,110	9,281	46,990
San Mateo	124,990	695,440	94	425
Santa Barbara	208,595	590,485	239	3,150
Santa Clara	5.584,480	41,129,250	25,862	198,186
Santa Cruz	1,365,414	7,315,935	240	1,855
Shasta	117,481	643,463	8,056	43,210
Sierra	----------	----------	----------	----------
Siskiyou	2.473	44,507	83	2,611
Solano	1,213,265	16,276,990	98,276	650,933
Sonoma	17,939,972	137,556,285	2,893	11,279
Stanislaus	1,932,302	18.595.445	33,726	118,198
Sutter	1,249,923	25,162,300	61,572	343,084
Tehama	1,307,218	16,416,690	32,919	219,396
Trinity	2,842	57,950	30	5
Tulare	7,227,491	95,037,424	1,977	59,822
Tuolumne	95,811	580,502	54	200
Ventura	36.398	505,892	12,057	166,180
Yolo	2,568,019	26,109,390	149,019	1,109,760
Yuba	162,751	2,652,510	3,163	19,535
Totals	144,097,670	1,979,686,525	1,166,730	6,292,513

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*For the number of grapevines and bearing trees in nuts in 1890 and 1900, see Report of 1912, pages 167-169.

XXXI.

TS BY COUNTIES.*

g Trees in 1910, and Production.
he Census Reports.)

Pecans		Walnuts		Total nuts	
Number of trees	Pounds	Number of trees	Pounds	Number of trees	Pounds
5	80	3,726	46,183	25,250	210,142
---	---	---	---	12	75
1	50	185	3,266	830	7,602
158	5,450	1,063	22,906	85,445	832,019
6	---	832	22,117	15,619	51,932
10	340	1,306	13,463	17,409	105,782
25	200	6,148	110,088	215,249	941,400
3	---	3	---	6	---
---	---	880	10,855	1,512	27,130
56	225	634	7,991	8,203	70,097
15	350	220	3,617	26,336	67,707
---	---	498	8,220	827	8,975
---	---	24	400	53	400
9	150	35	940	72	2,170
563	1,290	127	1,565	3,819	26,615
2	40	24	1,215	1.747	38,295
6	350	564	5,232	8,920	55,198
---	---	8	250	16	250
313	6,400	281,837	6,138,033	359,349	6,204,703
5	---	14	560	2,797	8,535
---	---	61	385	212	1,497
---	---	91	2,019	262	4,270
---	---	360	9,990	762	33,040
31	200	633	11,538	17,845	127,357
---	---	3	80	27	535
---	---	---	---	---	---
3	100	306	3,287	2,505	27,437
996	---	7,767	44,164	27,622	135,747
10	40	1,105	13,811	2,768	32,048
26	1,350	276,842	7,478,955	278,879	7,492,175
2	---	535	3,276	12,122	69,065
---	---	4	---	4	---
98	3,520	3,040	67,491	24,940	239,581
3	100	755	21,682	67,156	357.539
6	100	1,369	29,800	8,333	103,822
---	---	2,228	43,777	2,900	60,742
1,080	19,205	9,159	194,829	19,651	259,730
---	---	---	---	---	---
6	250	2,455	6,548	99,499	554,098
1	---	7,871	223,493	17,264	277,783
---	---	223	2,010	331	2,435
70	130	96.776	2,678,039	97,091	2,681,694
136	1,000	19,070	227,955	48,398	469,926
5	---	4,015	25,880	4,757	40,640
7	100	1,168	14,380	9,339	64,760
---	---	24	1,260	24	1,260
2	---	30	275	185	5,046
134	2,175	1,806	27,636	100,239	681,194
43	220	11,955	144,040	16.631	168,151
25	760	864	10,995	34,701	134,103
11	---	671	7,130	62,289	350.214
10	---	1,569	13,500	34,555	237,596
1	---	58	1,510	91	1,560
26	505	1,942	28,612	3,945	88,939
1	---	175	6,465	240	6,840
301	---	98.622	3,665,935	110,984	3,832,116
9	245	1,270	19,953	150,822	1,151,868
6	30	287	4,665	3,458	24,280
4,226	44,955	853,237	21,432,266	2,034,302	28,378,115

TABLE XXXII.

SMALL FRUITS BY COUNTIES.

Number of Acres in 1910, and Production.
(Compiled from the Census Reports.)

Counties	Strawberries		Blackberries and dewberries		Total*	
	Acres	Quarts	Acres	Quarts	Acres	Quarts
Alameda	18	41,770	12	20,225	401	890,867
Alpine	----------	----------	----------	----------	----------	1,510
Amador	6	9,259	13	18,655	29	46,124
Butte	48	54,513	57	76,793	148	207,794
Calaveras	5	11,210	14	13,366	34	37,948
Colusa	1	2,120	5	7,039	7	12,564
Contra Costa	1	2,880	3	2,774	6	13,654
Del Norte	1	1,050	----------	300	1	1,760
El Dorado	5	8,215	11	12,480	23	31,427
Fresno	148	750,708	91	247,186	310	1,196,643
Glenn	2	2,945	4	8,980	8	15,005
Humboldt	58	152,758	4	5,757	87	219,489
Imperial	----------	----------	1	1,426	1	1,726
Inyo	5	5,591	8	9,835	21	18,621
Kern	2	2,112	26	24,900	34	32,087
Kings	15	53,810	13	33,260	31	94,940
Lake	6	12,227	15	15,261	25	33,910
Lassen	3	3,380	2	2,354	20	14,889
Los Angeles	1,380	5,135,203	280	1,019,735	1,975	7,837,987
Madera	2	1,750	3	1,380	7	4,270
Marin	1	1,750	----------	380	3	5,130
Mariposa	1	1,217	2	4,470	7	8,705
Mendocino	22	35,296	14	11,900	57	69,492
Merced	5	8,377	21	25,230	34	47,293
Modoc	9	10,113	9	11,515	37	44,168
Mono	----------	1,220	----------	48	1	5,011
Monterey	263	2,449,084	56	268,180	407	3,663,576
Napa	22	45,316	26	18,903	59	72,503
Nevada	4	7,047	15	29,245	55	78,369
Orange	76	192,365	43	71,907	205	401,218
Placer	433	1,062,214	62	198,039	582	1,581,263
Plumas	6	6,828	1	584	13	11,881
Riverside	27	59,305	28	49,554	64	123,772
Sacramento	450	1,676,826	52	143,729	554	1,974,178
San Benito	35	34,367	1	4,310	54	68,426
San Bernardino	34	52,917	68	112,255	130	190,564
San Diego	43	275,744	22	45,635	87	369,546
San Francisco	----------	----------	----------	----------	----------	----------
San Joaquin	33	93,367	31	51,650	92	226,154
San Luis Obispo	45	61,895	30	42,845	137	131,117
San Mateo	56	210,850	10	15,030	69	232,655
Santa Barbara	24	125,766	32	99,084	63	233,123
Santa Clara	460	989,600	228	304,022	1,011	1,785,865
Santa Cruz	489	1,384,784	116	163,757	744	1,707,208
Shasta	44	51,975	32	35,067	95	112,667
Sierra	2	2,623	1	964	6	5,997
Siskiyou	7	15,011	10	11,057	31	41,053
Solano	5	11,060	5	5,560	12	19,110
Sonoma	103	195,330	930	1,413,936	1,471	2,106,103
Stanislaus	95	184,399	53	84,073	161	290,431
Sutter	1	1,550	7	8,008	16	24,186
Tehama	36	57,921	7	11,163	49	83,593
Trinity	5	4,668	5	4,307	15	14,039
Tulare	19	44,078	70	87,262	119	181,574
Tuolumne	5	10,652	8	9,729	19	29,153
Ventura	14	72,350	7	18,566	31	138,600
Yolo	1	210	6	6,162	10	10,774
Yuba	4	4,750	6	8,692	19	22,408
Total	4,585	15,694,326	2,576	4,898,524	9,687	26,824,120

*The totals include other fruits not specified.

PART VI.

CALIFORNIA WINE INDUSTRY.

Sweet Wines and Brandy in Other States, California Vineyards, Sparkling Wines, Grape Juice, Price of Wine Grapes, Vintages 1891-1914, Imports and Exports of Wine and Brandy, California Brandies.

The California wine industry, with its extensive vineyards of wine grapes and enormous investments of capital, has attained such proportions as to demand special notice. In sweet wines the production has more than doubled within the last ten years, and the output, both in wine and brandy, is much greater than that of all other states combined.*

The State Board of Viticultural Commissioners estimates that more than half the acreage of vineyards in the state is planted to wine grapes, the area being about 170,000 acres.

Wine and Brandy.

Almost all the sweet wine and brandy produced in the United States is made in California. New York and New Jersey make small quantities of port and sweet catawba, North Carolina and Virginia scuppernong, and Ohio appears as a maker of sweet wines in 1915 for the first time in ten years, with 6,863 gallons of scuppernong, but in 1916 made no sweet wine. Missouri also made a small quantity of sweet wine some ten years ago, but only about 1,500 gallons. The total production of sweet wine in the United States in 1915 was 17,168,698 gallons, of which quantity California supplied 16,868,374 gallons, and all other states 300,324 gallons. Of fruit brandy California produced 7,906,380 gallons, and all other states 615,571 gallons, or a total of 8,521,951 gallons in the United States.

Owing to the heavy tax on brandy for fortifying sweet wines, the quantity fell off enormously last season (August to December, 1915), the quantity produced being only about one-fifth of the usual production of wine, and one-third of that of brandy. The quantity of wine made was only 3,882,953 gallons, the lowest since 1893; and of brandy 2,613,286 gallons, the smallest quantity since 1899.

Production of Sweet Wines in the United States in 1913-1916.

State	Gallons, 1913	Gallons, 1914	Gallons, 1915	Gallons, 1916
New Jersey, port	8,045	18,845	17,373	11,334
New Jersey, sweet catawba		716	1,982	1,561
New York, port	175,279	200,853	58,694	91,397
New York, sweet catawba	462,510	371,370	214,396	319,203
North Carolina, scuppernong	92,031	47,752		
Virginia, scuppernong	581,672	215,550		
Ohio, sweet catawba			1,015	
Ohio, scuppernong			6,863	
Fractional gallons	3	2	1	2
Totals	1,319,540	855,088	300,324	423,497
California	17,927,812	17,473,353	16,868,374	6,578,510
Totals, United States	19,247,352	18,328,441	17,168,698	7,002,007

Production of Fruit Brandy in the United States, 1913-1916.

State	Gallons, 1913	Gallons, 1914	Gallons, 1915	Gallons, 1916
Sweet wine making states:				
New Jersey	64,609	75,888	95,778	56,159
New York	90,347	70,606	116,454	25,781
North Carolina	2,208	239	1,114	
Ohio	167,291	100,621	100,734	
West Virginia	127			
Other states (not making sweet wine)	455,731	295,424	301,491	297,880
Totals	780,313	542,778	615,571	379,820
California	7,472,561	6,765,119	7,906,380	3,779,532
Totals, United States	8,252,874	7,307,897	8,521,951	4,159,352

*For the early history of wine production in California, see Report of 1912, pages 170-172 and Report of 1913, pages 152-157.

The amount of fruit brandy produced in California in 1916 was 3,779,532 gallons, and in all the other states only 379,820 gallons, the total for the United States being 4,159,352 gallons.

Great Wine Grape Vineyards.

Some of the California vineyards are now the largest and best cultivated in the world. In the southern part of the state there is the large vineyard of the Italian Vineyard Company at Guasti in San Bernardino County, comprising 3,547 acres of all the best varieties, including Alicante Bouchet, Zinfandels, Burger, Folle Blanche, and a dozen others. In central California there is the Wahtoke vineyard, near Reedley, in Fresno County, of 3,631 acres, with 2,500 acres already planted and in bearing and containing some twenty of the leading varieties; and in northern California there is the Vina vineyard, in Tehama County, which until the last year or two had 1,500 acres, mostly in Zinfandel and Burger, but the vines are being removed to make way for orchard trees or other crops. This step has been taken because although the vineyard paid, it had become very foul with Johnson grass, which could not be eliminated as long as the vines were left in place. These are the most vineyards in the state.

There is no reliable data available regarding the production of the various kinds of dry wine, but since 1890 the exact figures for sweet wines and brandy have been recorded, and are here given, so that a comparison can be made. The quantity of sweet wine has increased during the last twenty years from 1,083,000 gallons in 1891 to 23,467,000 in 1912 (August–December, 1911), which is the heaviest in the history of the industry.

Port and sherry are the two leading wines, the former leading as a rule, but in some years the output of sherry comes to the front, as in 1903 and 1912, when it was upwards of 8,000,000 gallons. In the three years 1910–1912 the output of port was upwards of 9,000,000 gallons. Muscatel and Angelica are the next favorites, followed by Malaga and Tokay.

The imports of foreign wines have remained steady during the last few years, the value being about $10,000,000 annually.

It is acknowledged that the best wines of California and of South America are equal to those produced in Europe. California grows the principal wine grapes of France, Italy, Spain, Portugal and Germany, and the variety of types of wines produced is unequaled by any country in the world. Conditions suitable for the growth of any variety, including the American varieties of the Eastern States, are found here.

Surplus table and shipping grapes are used for the manufacture of wine, but the qualities desirable in a shipping grape differ from those of a good wine grape and the product is inferior. They are more suitable for making brandy, which is their principal use. Surplus raisin grapes are used for the same purposes, but the quality is somewhat better. Large quantities of sweet wine and brandy are made from the Muscat of Alexandria and form a special type of their own.

The great bulk of all the dry and sweet wines and of brandy is made from a special wine grape which is unsuited for other purposes.

Wine Grapes Used in California.*

Practically all the principal wine grapes of Europe have been introduced into California and tested. About four-fifths of the wine, both dry and sweet, however, is made from about a dozen varieties, and between forty and fifty will include over 95 per cent of the wine grapes.

The Zinfandel is the typical red wine grape of California and is grown in larger quantities than any other. From it the bulk of dry and sweet red wines is made. The proportion of Zinfandel, however, tends to diminish in newer plantings. Other red wine varieties largely planted are Carignane, Petite Sirah, Mataro, Petit Bouschet, Alicante Bouchet, Grenache, Blue Elbling and Charbono. The commonest white wine grapes are Burger, Colombar, Palomino, Green Hungarian, Feherzagoes and Muscat of Alexandria. Of table and raisin grapes, used largely for wine making, the principal are, besides the Muscat, Flame Tokay, Malaga, Sultanina (Thompson's Seedless) and Verdal.

The fine wines are made principally of Petite Sirah, Colombar and Semillon, though a large number of other fine varieties are used in varying amounts.

The yield of average vineyards varies from one or two tons per acre to eight or ten tons. This difference depends principally on the soil and climate and on the methods of the grape grower. Some varieties have the reputation of being heavy bearers and some of being light. The differences, however, are more those of proper adaptation to conditions and the use of proper viticultural methods.

Wine Grapes Recommended for California.

FOR COOLER REGIONS.

Fine wines of Rhine types: Franken Riesling, Johannisberger, Traminer.

Fine wines of Sauterne type: Semillon, Colombar, Sauvignon Blanc.

Fine wines of Chablis type: Marsanne, Chardonay, Peverella.

Bulk white wines: Palomino, Green Hungarian.

Fine wines of Medoc type: Cabernet Sauvignon, Beclan, Blue Portuguese, Verdot, Merlot.

Fine wines of Hermitage type: Petite Sirah, Mondeuse, Tannat.

Bulk red wines: Zinfandel, Carignane.

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*Professor Frederic T. Bioletti, of the University of California.

FOR WARMER REGIONS.

Fine white wines: Franken Riesling, Johannisberger, Vernaccia Sarda, Marsanne.

Bulk white wines: Burger, Folle Blanche, West's White Prolific.

Fine red wines: Valdepeñas, St. Macaire, Lagrain, Gros Mansenc, Barbera, Refosco.

Bulk red wines: Zinfandel, Alicante Bouchet.

FOR SWEET WINES.

Fine white: Furmint, Beba, Boal.

Bulk white: Palomino, Perruno, Mourisco, Branco.

Fine red: Trousseau, Tinta, Madeira.

Bulk red: Grenache, Mission, Monica, California Black Malvoisie, Tinta Amerella, Alicante Bouchet.

Muscat: Muscat of Alexandria, Frontignan.

Some varieties, such as the Riesling, give fine wines, though of different character, wherever they are planted. Others produce a fine wine in one locality and a poor wine in another. The Cabernet Sauvignon produces a fine wine in the cooler regions and a harsh, disagreeable wine in the hot regions. The Valdepeñas produces a better wine in the hot interior than in the coast regions.

Most of the varieties recommended for bulk wines are capable of yielding fine wines under favorable conditions, when blended with a sufficient quantity of finer varieties.

The production of wine and brandy is given for the fiscal year ending June 30, but as almost all the wine is made in the fall of the year, the vintage of sweet wines is really that of the previous year.

The production of sweet wine in the state during the 1915 season (August to December) fell off enormously, owing to the prohibitive tax levied by the Federal government under the emergency revenue act of October 22, 1914, the total vintage amounting to only 6,578,510 gallons, the smallest quantity since 1897. The production of brandy also fell off, the total quantity produced being only 3,779,532 gallons, or about one-half of the usual production, and the smallest since the year 1906.

Dry Wines.

The State Board of Viticultural Commissioners estimated the dry wine vintage in 1915 as follows:

	Gallons
Alameda County and bay cities, including wine made in cellars of foreigners in San Francisco	3,048 000
Napa County	4,708,000
Contra Costa County	870,000
Mendocino County	372,000
Sonoma County	7,493,000
Santa Clara County	2,591,000
Santa Cruz County	47,000
Sacramento County	590,000
Lodi section	1,500,000
Fresno section	250,000
Southern California	2,250,000
Various other localities	650,000
Total	21,571,000

Sparkling Wines, 1911-16.

The manufacture of sparkling wines is now engaging the attention of the wine makers in California and has proved to be successful. The production of naturally fermented champagne in the bottle during the last six years has varied considerably, the quantity made during this period being estimated as follows:

Year	Bottles
1911	580,000
1912	800,000
1913	1,000,000
1914	1,100,000
1915	732,600
1916	360,000

The bottling is done in the months of June and July of the following year.

Grape Juice.

The manufacture of grape juice in this state continues to decrease. The quantity made in 1916 is estimated at about 250,000 gallons, and it is claimed that so far there is no profit in its manufacture.

Many judges consider that some of the Eastern varieties of grapes, such as the Concord, are better suited for the making of grape juice.

Beer.

The amount of beer produced in California during the years 1913–1915 shows a steady decrease.

Year	Number of barrels	Amount of tax paid
1913	1,007,326	$1,007,326
1914	973,217	1,053,887
1915	937,665	1,406,479

Prices of Wine Grapes.

The prices paid for grapes vary considerably, according to the varieties and districts, and also according to the size of the crop from year to year.

In Fresno County, in 1911, the price paid for average sweet wine grapes (not including Muscats) was $10 per ton, and in 1912 from $5 to $6 per ton.

In other parts of the San Joaquin Valley and the Sacramento Valley $9 per ton was paid for average wine grapes in 1911, and as high as $11 for special varieties. In 1912 standard grapes were $6 per ton, and for special varieties, or under contract, as high as $10 per ton. During the year 1913 the average price was $10 per ton, and $27.50 per ton in dry wine districts in the coast counties. In 1914 the price paid to growers ranged from $6 a ton for culls to $14 for prime varieties. The price paid for grapes for dry wines ranged from $10 to $18 per ton, according to districts; in some localities as high as $25 per ton was paid for choice varieties. For the vintage season of 1916, $14 per ton was offered, a better price than for several years.

California Brandy.

The following summary shows that almost all the brandy made in the United States is produced by California. In 1915 California produced 7,906,380 gallons, and all other states only 615,571 gallons. In 1916 California produced 3,779,532, and all other states only 379,820.

Total Fruit Brandy Produced in the United States, 1891-1916.

For the fiscal year ending June 30	Production of fruit brandy, including apple, peach, and grape, gallons
1891	1,804,712
1892	3,667,465
1893	2,358,548
1894	2,948,159
1895	1,960,176
1896	3,403,852
1897	1,813,427
1898	2,906,198
1899	3,097,769
1900	3,760,487
1901	4,047,602
1902	4,220,400
1903	6,430,673
1904	5,193,262
1905	5,448,584
1906	4,444,072
1907	6,138,304
1908	6,899,823
1909	6,440,857
1910	7,656,433
1911	7,953,131
1912	9,321,823
1913	8,252,874
1914	7,307,897
1915	8,521,951
1916	4,159,352

Under the provisions of "An act to reduce revenue and equalize duties on imports, and for other purposes," approved October 1, 1890, provision was made for the fortification with grape brandy, free of tax, of pure sweet wine, and of wine intended for exportation. This act was amended by the acts of June 7, 1906, which imposed a tax of 3 cents per gallon, and on October 22, 1914, the tax was increased to 55 cents per gallon until January 1, 1916. The full tax on brandy is $1.10 per gallon. The amount used in this state for the fiscal year ending June 30, 1915, was 4,124,371 gallons at 3 cents, and 301,376 at 55 cents. Since that year exact returns have been kept by the Internal Revenue Department of the quantity of the various kinds of wines produced and the amount of brandy used for fortification.

Brandy From Other Fruits.

Brandy is also produced from other fruits, and until 1908 was shown separately from grape brandy in the internal revenue returns; since then all brandy is included under the head of "fruit brandy." The quantity, however, is not large; in 1908, the last year the varieties are shown separately, fruit brandy, other than grape brandy, was only 94,558 gallons, while grape amounted to 5,367,489 gallons.

Variety and Quantity of Fruit Brandy in 1907.

Varieties	Gallons
Prune	60,594
Peach	21,210
Pear	9,339
Apricot	2,178
Apple	897
Orange	280
Fig	30
Berry	30
Total	94,558

The production of brandy has also greatly increased; in 1891 the quantity amounted to only 1,804,712 gallons, but the last five years it has been between 7,000,000 and 9,000,000 gallons, about half of which is used for fortifying the sweet wines.

SUMMARY OF CALIFORNIA VINTAGES,* 1890-1916.

(For the fiscal year ending June 30.)

Year	Sweet wine, gallons	Dry wine, gallons	Total wine, gallons	Brandy used for fortification
1890	----------	----------	14,626,000	----------
1891	1,083,274	18,900,000	19,983,274	193,557
1892	2,746,655	12,200,000	14,946,655	695,844
1893	2,652,480	22,000,000	24,652,480	617,593
1894	4,724,595	9,200,000	13,924,595	1,112,794
1895	4,242,600	13,700,000	17,942,600	1,018,483
1896	6,084,009	10,900,000	16,984,009	1,484,887
1897	4,968,339	11,400,000	16,368,339	1,174,466
1898	7,024,372	24,400,000	31,424,372	1,688,949
1899	7,779,031	11,200,000	18,979,031	1,860,721
1900	8,433,383	15,000,000	23,433,383	2,063,033
1901	9,177,560	13,000,000	22,177,560	2,220,659
1902	9,301,353	33,600,000	42,901,353	2,292,721
1903	16,059,747	18,500,000	34,559,747	4,011,865
1904	13,571,845	16,000,000	29,571,845	3,329,804
1905	13,161,198	18,000,000	31,161,198	3,260,421
1906	11,502,309	29,000,000	40,502,309	2,998,998
1907	15,657,572	26,800,000	42,457,572	3,962,352
1908	16,491,169	27,700,000	44,191,169	4,233,977
1909	14,368,025	33,900,000	48,268,025	3,678,376
1910	18,086,868	27,400,000	45,486,868	4,702,863
1911	18,850,167	26,000,000	44,850,167	4,951,640
1912	23,467,444	25,000,000	48,467,444	6,153,131
1913	17,927,812	22,000,000	39,927,812	4,671,415
1914	17,473,353	26,300,000	43,773,353	4,643,812
1915	16,868,374	21,571,000	38,439,374	4,425,747
1916	6,578,510	28,000,000	34,578,510	1,156,105

*The above figures for sweet wine and brandy are exact; the amount of dry wine can only be estimated, as no complete records are kept. Wines being made in the fall, the vintages belong to the previous year, thus the vintage for the year ending June 30, 1916, was mostly made from August to December, 1915.

SUMMARY OF WINES PRODUCED, BY VARIETIES, 1891-1916.

(Gallons.)
(For fiscal year ending June 30.)

Year	Angelica	Frontignan	Lenoir	Madeira	Malaga
1891	182,208	----------	----------	----------	3,248
1892	379,964	----------	----------	----------	62,000
1893	339,590	----------	----------	----------	----------
1894	386,860	----------	----------	----------	42,929
1895	364,297	6,133	949	----------	2,795
1896	466,156	6,327	6,081	----------	2,906
1897	330,032	9,020	----------	2,269	----------
1898	748,686	----------	----------	----------	11,614
1899	438,419	3,048	----------	----------	14,267
1900	870,195	----------	----------	----------	975
1901	548,095	----------	----------	901	----------
1902	465,104	----------	----------	----------	----------
1903	887,238	----------	----------	----------	----------
1904	1,029,404	----------	----------	----------	81,136
1905	1,187,683	----------	----------	----------	18,847
1906	566,604	----------	----------	----------	8,098
1907	1,009,600	----------	----------	----------	11,899
1908	1,513,534	----------	452	13,316	216,390
1909	919,540	----------	----------	51,716	73,518
1910	1,361,290	----------	----------	2,785	81,175
1911	1,241,431	----------	----------	363,455	223,739
1912	2,609,518	----------	----------	119,781	327,172
1913	1,640,738	----------	----------	48,714	184,308
1914	1,195,641	----------	----------	40,914	288,170
1915	1,305,978	----------	----------	81,636	75,818
1916	667,644	----------	----------	----------	103,984

SUMMARY OF SWEET WINE PRODUCED, BY VARIETIES, 1891-1916.

(Gallons.)
(For fiscal year ending June 30.)

Year	Muscatel	Port	Sherry	Sweet Catawba	Tokay
1891	106,922	663,668	124,837	----------	2,391
1892	145,735	1,723,744	423,383	555	5,686
1893	353,299	1,535,227	424,138	226	----------
1894	400,064	2,808,832	1,084,714	----------	1,193
1895	188,437	2,309,702	1,370,284	----------	----------
1896	863,227	2,613,734	2,118,942	----------	6,634
1897	960,897	1,670,495	1,994,649	----------	974
1898	721,556	3,158,545	2,372,197	----------	11,772
1899	819,105	3,441,592	3,053,163	----------	9,433
1900	868,388	3,949,631	2,697,682	----------	46,508
1901	1,611,116	4,407,250	2,597,377	----------	12,819
1902	1,909,485	2,854,477	4,069,538	----------	2,749
1903	1,741,952	5,171,103	8,233,871	----------	25,580
1904	721,033	7,630,881	4,109,075	----------	316
1905	1,398,532	5,530,310	5,011,744	----------	14,080
1906	933,647	5,322,203	4,648,305	----------	23,448
1907	1,484,447	7,708,226	5,443,397	----------	----------
1908	2,449,211	6,015,052	6,267,323	----------	12,400
1909	2,242,412	5,859,630	5,189,598	----------	31,607
1910	1,767,387	9,051,017	5,690,080	----------	133,132
1911	1,087,411	9,780,864	5,955,886	----------	187,882
1912	2,247,219	9,522,237	8,559,868	----------	81,645
1913	2,070,827	8,334,993	5,619,502	----------	28,725
1914	1,512,727	9,160,980	5,235,102	----------	39,816
1915	1,095,411	9,240,281	5,018,983	----------	50,262
1916	758,436	3,347,957	1,694,884	----------	5,603

NOTE.—The wine is made in the fall of the previous year, which is the real date of the vintage, but the returns are made for the fiscal year ending June 30.

In 1892, 5,588 gallons of Sauterne were reported, and in 1908, 3,488 gallons of Moselle, but this is probably an error, as neither can be classed as sweet wines.

CALIFORNIA BRANDY, 1891-1916.

(For fiscal year ending June 30.)

Year	Produced	Number of fruit distilleries		
		Used for fortification of sweet wines	Registered	Operated
1891	1,474,876	193,557	288	284
1892	2,197,613	695,844	298	295
1893	1,642,284	617,593	292	286
1894	2,256,607	1,112,794	272	267
1895	1,677,082	1,018,483	270	268
1896	2,066,404	1,484,887	235	229
1897	1,439,285	1,174,466	239	237
1898	2,382,241	1,688,949	267	267
1899	2,775,164	1,860,721	238	232
1900	3,060,078	2,063,033	208	194
1901	3,194,544	2,220,659	222	212
1902	3,464,391	2,292,721	213	209
1903	5,614,215	4,011,865	230	223
1904	4,451,928	3,329,804	225	216
1905	4,602,133	3,260,421	224	218
1906	3,864,080	2,998,998	224	201
1907	5,367,489	3,962,352	209	193
1908	*6,388,076	4,233,977	216	202
1909	*5,971,171	3,678,376	206	201
1910	*7,170,212	4,702,863	203	195
1911	*7,316,488	4,951,640	211	202
1912	*8,721,693	6,153,131	192	181
1913	*7,472,561	4,671,415	184	179
1914	*6,765,119	4,643,812	189	183
1915	7,906,380	4,425,747	175	163
1916	*3,779,532	1,156,105	163	139

*Including fruit brandy other than grape but the quantity is very small.

IMPORTS AND EXPORTS OF WINE AND BRANDY, 1891-1916.

Wines Imported.

Year	Champagne and other sparkling wines		Still wines in casks		Still wines in bottles		Total value of wines
	Dozen quarts	Value	Gallons	Value	Dozen quarts	Value	
1891	400,084	$5,615,872	3,860,503	$2,641,816	348,666	$1,749,372	$10,007,060
1892	319,592	4,571,816	3,477,989	2,464,484	365,140	1,908,203	8,944,503
1893	374,124	5,579,054	3,525,625	2,505,024	413,860	2,121,275	10,205,353
1894	237,360	3,498,522	2,599,693	1,817,813	296,097	1,423,143	6,739,478
1895	257,757	3,807,961	2,789,153	1,945,347	296,779	1,430,229	7,183,537
1896	246,393	3,628,319	2,834,898	1,950,770	314,190	1,527,916	7,107,005
1897	228,628	3,348,004	2,997,952	2,039,250	309,281	1,475,211	6,862,465
1898	223,827	3,264,323	1,930,870	1,392,710	268,921	1,312,147	5,969,180
1899	262,371	3,668,791	2,253,226	1,573,573	274,873	1,347,842	6,590,206
1900	310,149	4,114,908	2,533,828	1,744,736	315,920	1,560,851	7,421.495
1901	311,078	4,589,494	2,785,850	1,942,322	373,832	1,687,420	8,219,236
1902	335,256	4,930,768	3,300,026	2,143,433	397,818	1,846,937	8,921,138
1903	407,944	5,861,639	3,753,211	2,292,297	440,869	2,095,360	10,249,396
1904	336,245	4,969,635	4,007,691	2,387,018	471,153	2,035,217	9,391,870
1905	371,811	5,723,764	3,973,919	2,352,485	488,773	2,165,672	10,241,921
1906	415,394	6,127,062	4,482,499	2,567,712	546,688	2,299,194	10,993,968
1907	419,403	6,228,281	5,213,458	2,966,154	636,938	2,614,346	11,808,781
1908	366,669	5,221,070	5,443,782	3,008,996	628,428	2,516,461	10,746,527
1909	436,628	6,863,785	5,747,056	2,838,232	650,861	2,574,596	12,276,613
1910	391,003	6,302,377	7,100,661	3,527,896	822,243	3,177,020	13,007,293
1911	218,495	3,566,824	4,812,787	2,638,039	596,521	2,326,750	8,531,613
1912	281,134	4,688,090	3,864,071	2,488,744	577,244	2,414,621	9,591,451
1913	280,828	4,636,191	4,417,130	2,718,045	677,111	2,724,471	10,078.707
1914	270,002	4,418,958	5,220,380	2,757,434	728,303	2,940,277	10,116,669
1915	114,630	2,004,680	3,860,273	1,968,587	626,865	2,273,916	6,247.183
1916	206,210	3,532,022	3,455,756	2,267,561	546,119	2,197,311	7,996,894

Brandy Imported, 1891-1916.

(Duty, brandy and other spirits, $2.60 per proof gallon.)

Year	Proof gallons	Value
1891	443,278	$1,139,315
1892	333,234	889,883
1893	326,303	918,165
1894	201,433	568,458
1895	313,327	813,882
1896	250,704	690,761
1897	337,595	911,721
1898	137,902	395,758
1899	219,968	626,875
1900	244,100	696,540
1901	290,301	843,318
1902	316,222	911,419
1903	348,878	1,000,997
1904	390,988	1,104,410
1905	403,386	1,139,129
1906	470,433	1,286,270
1907	629,333	1,687,473
1908	592,382	1,523,842
1909	764,244	1,961,170
1910	716,259	1,899,021
1911	409,242	1,018,382
1912	509,286	1,316,031
1913	610,358	1,647,277
1914	602,563	1,617,483
1915	400,203	1,035,562
1916	536,342	1,576,481

Domestic Wines and Brandy, 1891-1916.

(Exported.)

Year	Casks		Bottled		Total value of wines	Brandy, proof gallons	Value
	Gallons	Value	Dozen bottles	Value			
1891	543,292	$319,085	11,409	$52,392	$371,477	136,529	$111,657
1892	655,795	371,344	14,834	67,686	439,030	216,696	178,294
1893	708,558	369,893	11,128	51,654	421,547	123,518	90,731
1894	802,192	380,588	13,813	63,860	444,448	361,653	291,022
1895	1,125,297	545,708	13,919	56,202	601,910	100,719	94,924
1896	1,339,090	581,827	17,147	69,460	651,287	89,259	87,294
1897	1,389,375	629,270	16,794	69,444	698,714	11,815	12,640
1898	1,623,103	682,028	9,672	46,721	728,749	24,886	39,455
			Doz. qts.				
1899	1,498,078	624,315	10,973	52,015	676,330	20,944	29,289
1900	1,408,859	575,665	9,854	49,927	625,592	80,259	83,698
1901	1,117,858	461,560	9,901	43,013	504,573	15,323	28,176
1902	929,900	407,345	10,952	42,980	450,325	24,077	30,174
1903	678,150	290,552	5,232	24,624	315,176	18,117	19,213
1904	896,643	403,557	6,066	33,136	436,693	70,193	44,119
1905	839,386	355,215	5,800	28,242	383,457	21,171	18,217
1906	789,526	326,335	5,596	25,215	351,550	5,145	8,553
1907	560,147	251,353	4,404	20,128	271,481	14,172	22,496
1908	438,676	195,160	6,273	30,830	225,990	2,750	4,900
1909	415,891	181,516	3,839	19,902	201,418	14,718	12,262
1910	501,348	193,597	5,962	31,314	224,911	---------	---------
1911*	1,394,994	---------	---------	---------	518,536	---------	---------
1912	957,120	---------	---------	---------	366,260	---------	---------
1913	1,075,151	---------	---------	---------	418,668	---------	---------
1914	941,357	---------	---------	---------	373,412	---------	---------
1915	819,310	---------	---------	---------	332,369	---------	---------
1916	1,133,274	---------	---------	---------	450,598	---------	---------

Brandy was included under "Alcohol" prior to 1891, and included in "All other spirits" after 1910.

*Not stated in detail after 1910. The quantity includes wines both in casks and bottles.

Duty on Imported Wines, Etc.

Wine containing more than 24 per cent of alcohol is classed as spirits and charged accordingly. Champagne and sparkling wines $9.60 per dozen quarts, $4.80 per dozen pints. Half pints $2.40 per dozen. Bottles containing more than one quart to pay at the rate of $3.00 per gallon on the excess. Still wines in casks, if containing 14 per cent or less of alcohol, 45 cents per gallon; above 14 per cent, 60 cents per gallon. In bottles, per case of one dozen quarts, or two dozen pint bottles, $1.85 per case. Bottles containing more than the above, 6 cents per pint on the excess. Duty on brandy and other spirits, $2.60 per proof gallon.

PART VII.

IRRIGATION

Description of Irrigation Enterprises; Source of Water Supply; Cost of Irrigation; Irrigated Crops, and Orchards; Irrigation Districts; Colorado River and Salton Sea; Tulare and Other Lakes; Summary of Agricultural and Irrigated Areas; Irrigation from Underground Waters; California Rivers and Creeks; Acreage of Irrigated Farms by Counties; Main Ditches, Flowing and Pumped Wells.

Farms and Irrigation.

In most sections of California there is usually sufficient rainfall for the maturing of some crops, although there are other sections where no crops can be grown without irrigation. The normal annual precipitation ranges from about 2 inches in the Imperial Valley, in the southeastern part of the state, to about 60 inches along the coast in the northwestern part.

Irrigation is practiced to some extent throughout the state, but the largest part of the irrigated land lies in the southern part of the Sacramento and the San Joaquin valleys and in the northern part of the state.

In 24 of the 58 counties in the state more than half the farms are irrigated. Imperial County has the largest percentage of farms irrigated, 94.6, and Inyo County the next largest, 93.2 per cent. In both 1900 and 1910 the county for which the largest area of irrigated land was reported was Fresno, with an irrigated acreage of 402,318, compared with 283,737 in 1900. In Tulare County 265,404 acres were irrigated in 1910, and in five other counties the area irrigated exceeded 100,000 acres. The summary on page 197 shows that in 1910 existing enterprises were ready to supply water to 3,619,378 acres, or 955,274 acres more than were irrigated in 1909. The acreage included in projects exceeded the acreage irrigated in 1909 by 2,826,256 acres, which is more than twice the acreage brought under irrigation in the last decade. This acreage represents the area which will be available for the extension of irrigation in the next few years, upon the completion of projects now under way and without new undertakings.

Description of Enterprises.

Name	Acreage irrigated	Per cent distribution
United States Reclamation Service	400	*
United States Indian Service	3,490	0.1
Irrigation districts	173,793	6.5
Cooperative enterprises	779,020	29.2
Commercial enterprises	746,265	28.0
Individual and partnership enterprises	961,136	36.1
Totals	2,664,104	100.0

*Less than one-tenth of one per cent.

United States Reclamation Service enterprises, which operate under the federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction, and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who own no interest in the works. Persons obtaining water from such enterprises are usually required to pay for the right to receive water, and to pay, in addition, annual charges based in some instances on the acreage irrigated and in others on the quantity of water received.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization. It is not always possible to distinguish between partnership and cooperative enterprises, but as the difference is slight this is unimportant.

Irrigation districts, cooperative enterprises and individual and partnership enterprises, which together supply about 72 per cent of the acreage irrigated, are all controlled by the water users. Commercial enterprises, the only other class in the state that irrigates any extensive acreage, supplies 28 per cent.

The United States Reclamation Service operates under the federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands.*

The United States Indian Service operates under various acts of Congress, providing for the construction by that service of works for the irrigation of land in the Indian reservations.

The Carey Act, or federal law of August 18, 1894, granted to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation.

Irrigation districts are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes, with the object of obtaining funds for the purchase or construction, and for the operation and maintenance of irrigation works.

Cooperative Enterprises. These are controlled by the water users under some organized form of cooperation. The most common form is a stock company, the stock of which is owned by the water users.

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*See list of reclamation projects and crop results, page 200.

Commercial enterprises supply water to parties who own no interest in the works. Persons obtaining water from such enterprises are usually required to pay for the right to receive water and to pay, in addition, annual charges based in some instances on the acreage irrigated and in others on the quantity of water received.

Individual and partnership enterprises belong to individual farmers or to neighboring farmers, who control them without formal organization. It is not always possible to distinguish between partnership and cooperative enterprises, as the difference is slight.

Source of Water Supply.

As in other states, streams are the principal sources of supply of water for irrigating, but in California wells supply much more land than in any other state. Much land receives water from both sources, but most of this is credited to streams. The watersheds of the principal streams are protected by national forests administered by the United State Forest Service which affords to them effective protection against denundation either by forest fires or the unregulated cutting of their timber.

Source	Acreage irrigated	Per cent distribution
Streams	2,246,722	84.3
Lakes	18,470	0.7
Wells	350,723	13.2
Springs	31,779	1.2
Reservoirs	16,410	0.6
Totals	2,664,104	100.0

The preceding figures show the extent to which underground water is utilized for irrigation in California. The flowing wells, of which there were 2,361, with a total capacity of 477,343 gallons per minute, irrigated 74,128 acres. The great majority of these wells are in southern California and the San Joaquin Valley, and the land thus irrigated is situated in Kern, Kings, Los Angeles, Orange, Riverside, San Bernardino, Santa Clara, and Tulare counties. Of the 10,724 pumped wells, 5,248 were in the counties named and 4,503 in Fresno, Merced, Monterey, Sacramento, San Benito, San Diego, San Joaquin, and Ventura counties. The pumped wells in these two groups of counties irrigated 258,687 of the 276,595 acres irrigated by such wells in the entire state. Pumping from lakes and streams has also been practiced extensively in many sections of the state, 32,539 acres having been irrigated in this way in 1909.

The Cost of Irrigation.

The following summary shows the total cost of irrigation enterprises up to July 1, 1910, including construction of works and acquisition of rights, but not operation and maintenance, with the average cost per acre, based on the acreage the enterprises were capable of irrigating in 1910:

	1900	1910	Increase, per cent
Cost of irrigation enterprises	*$19,181,610 00	$72,580,030 00	278.3
Average per acre	†13 27	20 05	--------
Estimated final cost of existing enterprises	----------------	84,392,344 00	--------
Average per acre included in projects	----------------	15 37	--------

*Exclusive of those on Indian reservations.
†Exclusive of 242 acres in Indian reservations.

The cost of irrigation systems shows the largest increase of any item, amounting to 278.3 per cent. In the average cost per acre there was also a considerable increase, compared with 1900. The large increased cost of irrigation enterprises is due in a considerable measure to the expensive equipment installed to secure a water supply and protect it from loss by seepage and evaporation, in sections where water is scarce and crop values are high. A number of large enterprises are under construction upon which considerable expenditures have been made, but which are irrigating little land as yet, making the average cost higher than the true average. The average, based on the estimated final cost and the acreage included in projects, $15.37 per acre, probably more truly represents the average cost per acre of irrigation in California.

In the county showing the lowest average cost, Mono, where much of the irrigated land consists of flooded pastures, enterprises were capable of irrigating in 1910 at $1.29 per acre. The highest average cost per acre, $368.40, is in Nevada County, where the unusual cost is due to the fact that many of the ditches now used for irrigation were originally constructed at heavy expense for mining purposes.

Irrigated Crops.

(From the Reports of the Bureau of the Census.)

The information relating to irrigated crops is to some extent incomplete; it shows, however, the relative importance of the different irrigated crops, and is sufficiently complete to afford reliable averages of yields and for comparison with totals for the state.

Acreage Yield.

Crop	Total for state	Irrigated		Total for state	On irrigated land
		Amount	Per cent of total		
Cereals—				Bushels	Bushels
Corn	51,935	17,802	34.3	1,273,901	491,978
Oats	192,158	5,903	3.1	4,143,688	205,727
Wheat	478,217	22,603	4.7	6,203,206	408,706
Barley	1,195,158	77,785	6.5	26,441,954	1,844,971
Rye	7,027	107	1.5	70,683	1,265
Other grains and seeds—					
Alfalfa seed	8,761	2,570	29.3	23,791	5,911
Dry edible beans	157,987	11,384	7.2	3,328,218	244,624
Dry peas	2,959	290	9.8	57,468	9,902
Hay and forage—				Tons	Tons
Timothy alone	13,725	8,026	58.5	20,001	11,236
Timothy and clover mixed	46,661	20,880	44.7	73,183	34,177
Clover alone	8,519	1,176	13.8	20,380	2,689
Alfalfa	484,134	366,692	75.7	1,639,707	1,280,105
Other tame or cultivated grasses	92,556	6,504	7.0	122,103	10,656
Wild, salt or prairie grasses	253,127	153,672	60.7	281,033	189,964
Grains cut green	1,604,745	101,187	6.3	2,019,526	146,013
Coarse forage	25,868	7,593	29.4	60,611	19,151
Sundry crops—				Bushels	Bushels
Potatoes	67,688	32,735	48.4	9,824,005	5,180,006
				Tons	Tons
Sugar beets	78,671	14,657	18.6	843,269	171,494
Orchard fruits	*	73,491	*	-----	-----
Small fruits	9,687	6,876	71.0	-----	-----
Tropical fruits	*	98,969	*	-----	-----
Nuts	*	22,429	*	-----	-----
Grapes	*	74,984	*	-----	-----

*Agricultural returns only give number of trees, not acreage.

Acreage of Irrigated Crops.

Of the entire acreage of the crops in the preceding table, slightly less than one-fifth is irrigated, the proportion irrigated varying widely for the different crops.

The cereals are very generally grown without irrigation, only 6.5 per cent of the total acreage of the cereal crop above given being irrigated. The hay and forage crops are more generally irrigated than the cereals, the irrigated acreage forming 26.3 per cent of the total for these crops, alfalfa being the highest, 75.7 per cent. Of the entire acreage for potatoes 48.4 per cent was irrigated, and that in small fruits 71 per cent.

Sugar beets are grown for the most part without irrigation in California, only 18.6 per cent of the total acreage of the crop being irrigated. While many of the crops irrigated are well distributed geographically, there is a tendency toward the concentration of certain crops in particular localities.

Irrigation Acreage in Orchards.

The following summary gives the counties having the largest acreage of the principal irrigated crops, with the proportions which each contains of the total irrigated acreage of these crops in the state:

Of the orchard fruits irrigated: Fresno County has 31.9 per cent; Placer, 14.8 per cent; Tulare, 8.4 per cent; Santa Clara, 6.5 per cent.

Of small fruits: Los Angeles County, 30.4 per cent; Santa Clara, 13.9 per cent; Sacramento, 10.9 per cent; Santa Cruz, 7.2 per cent.

Tropical fruits: San Bernardino County, 25.6 per cent; Los Angeles, 24.8 per cent; Riverside, 14.2 per cent; Tulare, 11.6 per cent.

Nuts: Orange County, 46 per cent; Los Angeles, 34.7 per cent; Ventura, 12.1 per cent.

Grapes: Fresno County, 62.6 per cent; Tulare, 12.2 per cent; Kings, 6.2 per cent; Sacramento, 5.7 per cent.

Of the total irrigated acreage of fruit trees and vines not bearing in 1909, amounting to 59,031, 36.1 per cent was in Fresno County, 14 per cent in Tulare County, 8 per cent in Orange County, and 7.2 per cent in Los Angeles County.

SUMMARY OF IRRIGATED FARMS AND IRRIGATION ENTERPRISES IN 1900 AND 1910.

	1900	1910	Increase	Per cent
Number of farms in state	72,542	88,197	15,655	21.6
Number of farms irrigated	25,675	39,352	13,677	53.3
Acreage irrigated	1,446,114	2,664,104	1,217,990	84.2
Acreage enterprises were capable of irrigating in 1910	*	3,619,378	------------	--------
Acreage included in projects	*	5,490,360	------------	--------
Percentage of number of farms irrigated	35.4	44.6	9.2	--------
Percentage of improved lands in farms irrigated	12.1	23.4	11.3	--------
Irrigation enterprises—				
Number of independent enterprises	*	13,970	------------	--------
Total length of ditches (miles)	*	21,129	------------	--------
Number of main ditches	*	8,590	------------	--------
Length of main ditches (miles)	*	12,620	------------	--------
Capacity of cubic feet per second	*	89,597	------------	--------
Number of lateral ditches	*	6,143	------------	--------
Length of lateral ditches (miles)	*	8,509	------------	--------
Number of reservoirs	*	1,583	------------	--------
Capacity (acre feet)	*	743,269	------------	--------
Number of flowing wells	*	2,361	------------	--------
Capacity, gallons per minute	*	477,343	------------	--------
Number of pumped wells	*	10,724	------------	--------
Capacity, gallons per minute	*	4,119,575	------------	--------
Acreage irrigated with pumped wells	*	276,595	------------	--------
Acreage irrigated with flowing wells	*	74,128	------------	--------
Acres irrigated with pumped water from all sources, including lakes and streams	*	309,134	------------	--------
Number of pumping plants	*	9,297	------------	--------
Engine capacity, horsepower	*	128,143	------------	--------
Pumping capacity, gallons per minute	*	5,276,298	------------	--------
Total cost of irrigation systems	$19,181.610	$72,580,030	$53,398,420	278.3
Average cost per acre	13.27	20.05	6.76	51.0

*Not reported in 1900.

NOTE.—Reservoirs are those filled by collecting storm water, or from watercourses that are usually dry. When reservoirs are filled from streams or wells the primary source is considered the source of supply. The "acre-foot" is the volume of water required to cover one acre to a depth of one foot or 43,560 cubic feet.

Irrigation in 1910 Compared with the Year 1900.

The increase in irrigation during the last decade has been very large. The total number of farms irrigated was 39,352, against 25,657 in 1900, an increase of 13,677, or 53.3 per cent. The per cent irrigated of the whole number of farms was 44.6, compared with 35.4 per cent in 1900, showing an increase of 9.2 per cent during the ten years.

The total acreage irrigated in 1910 was 2,664,104 acres, against 1,446,114 acres in 1900, an increase of 1,217,990 acres, or 84.2 per cent. The total acreage which all enterprises were capable of irrigating in 1910 was 3,619,378, an excess of 955,274 acres over the area irrigated in 1909. The area included in projects either contemplated or under construction in 1910 was 5,490,360 acres. This indicates in a general way the area which will be available within the next few years for the extension of irrigation, and shows that the area irrigated in 1910 can be more than doubled without the construction of additional works.

The number of independent enterprises in 1910 was 13,970. The total length of all ditches was 21,129 miles, of which there were 8,590 main ditches, extending 12,620 miles, and 6,143 lateral ditches, with 8,509 miles. The length of main ditches in 1900 was 5,106 miles, showing an increase in the ten years of 7,493 miles, or 146.7 per cent.

The number of reservoirs reported was 1,583, having a capacity of 743,269 acre feet.

The number of wells pumped for irrigation was 10,724, with a capacity of 4,119,575 gallons per minute. The number of pumping plants was 9,297, with an engine capacity of 128,143 horsepower and a pumping capacity of 5,276,298 gallons per minute. The flowing wells numbered 2,361, with a capacity of 477,343 gallons a minute.

The total cost of irrigation systems in 1910 was $72,580,030, against $19,181,610 in 1900, an increase of $53,398,420, or 278.3 per cent.

The average cost per acre was $20.05 in 1910, against $13.27 in 1900.

Irrigation Projects in California.

The Orland Project. This project is in the Sacramento Valley and includes about 14,000 acres in Glenn and Tehama counties, principally in the former. In 1913 upwards of 6,600 acres were irrigated, and in 1914 7,354 acres. The principal crops raised were alfalfa 5,817 acres, pasture 4,099 acres, sorghum 146 acres, small fruit 22 acres, deciduous 88 acres, comprising apples, peaches, pears, prunes, and apricots, which produced approximately 10,200 boxes. There were also 90 acres in citrus fruits, 87 in almonds, 3 in nursery, and 72 in garden. The total value produced amounted to $176,331, or $26.99 per acre.

Yuma or Laguna Project. This project is principally in Arizona, but will cover about 17,000 acres of the Colorado desert, in Imperial County. The Laguna dam is situated on the Colorado River, about twelve miles above Yuma, and diversions will be made to both sides. The land on the California side is included in the Yuma Indian reservations and all but 4,000 acres, reserved for the Indians, is open to bona fide settlers.

Klamath Project. This covers land in Oregon and California, and is largely a drainage proposition in California, being the reclamation of swamp land surrounding Lower Klamath Lake, and the lowering of the water level in Tule Lake, in Siskiyou and Modoc counties.

Receipts from the Sale of Public Lands in California for Irrigation Work to June 30, 1916.

	Fiscal year 1916	Total value to June 30, 1916
Receipts from sale of land	$181,157 29	$5,953,831 91
Allotments to June 30, 1916	252,631 53	3,516,874 51
Net investments to June 30, 1916	191,415 37	2,979,219 89

Project	Per cent chargeable to state	Allotments		Net investment	
		Fiscal year 1916	To June 30, 1916	Fiscal year 1916	To June 30, 1916
Yuma	17	$119,138 55	$1,591,848 55	$78,267 32	$1,383,672 49
Orland	--------	71,345 00	1,026,345 00	81,515 52	869,476 54
Klamath	25	54,998 03	774,998 03	23,018 10	619,754 85
Colorado River	17	--------------	7,430 70	--------------	7,430 70
Colorado River Basin	17	5,819 95	18,569 95	5,737 07	15,363 77
Iron Canyon	--------	25 00	19,210 96	2 12	9,779 45
Pit River	--------	55 00	2,555 00	90 25	2,489 18
Shasta County	--------	942 00	3,442 00	2,100 54	2,140 99
Lassen County	--------	308 00	5,308 00	684 45	1,945 60
Owens Valley	--------	--------------	12,061 92	--------------	12,061 92
Sacramento Valley	--------	--------------	43,620 72	--------------	43,620 72
San Joaquin	--------	--------------	3,531 20	--------------	3,531 20
Preliminary investigations	--------	--------------	7,952 48	--------------	7,952 48
Totals	--------	$252,631 53	$3,516,874 51	$191,415 37	$2,979,219 89

Irrigation Projects in the United States.

(Irrigation and crop results on reclamation projects, 1916.[1])

State	Project	Irrigable acreage[2]	Irrigated acreage	Cropped acreage[3]	Value of crops, total[3]
Arizona	Salt River	[4]219,691	[4]192,464	173,359	$8,435,719
Arizona-California	Yuma	72,440	29,483	28,283	1,435,403
California	Orland	20,533	9,357	7,011	342,339
Colorado	Grand Valley	15,000	1,741	1,561	54,692
	Uncompahgre Valley	77,713	49,273	48,352	1,949,529
Idaho	Boise	103,370	76,922	72,581	2,327,494
	Minidoka	120,800	88,333	81,362	2,800,431
Montana	Huntley	32,905	18,635	18,581	489,071
	Milk River	40,358	5,518	4,592	70,016
	Sun River	16,321	4,717	[5]4,700	[5]86,950
Montana-No. Dakota	Lower Yellowstone	42,288	6,020	6,020	124,586
Nebraska-Wyoming	North Platte	112,016	75,620	74,766	1,633,390
Nevada	Truckee-Carson	69,100	39,449	38.249	791,446
New Mexico	Carlsbad	24,775	16,600	14,500	399,901
	Hondo	2,918	1,324	1,219	32,200
New Mexico-Texas	Rio Grande	85,000	62,513	61,818	2,893,740
Oregon	Umatilla	17,000	5,477	3,900	139,800
Oregon-California	Klamath	45,272	29,351	29,351	509,865
South Dakota	Belle Fourche	78,567	48,468	46,909	557,319
Utah	Strawberry Valley	50,000	30,722	25,066	1,320,135
Washington	Okanogan	10,099	7,850	5,242	328,385
	Yakima:				
	Sunnyside Unit[6]	93,226	73,000	59,449	4,341,940
	Tieton Unit	34,000	23,000	21,000	1,102,536
Wyoming	Shoshone	42,623	29,977	28,695	600,903
Totals for irrigated areas covered by crop reports		1,426,015	925,814	856,566	$32,767,790
Additional project areas irrigated but not covered by crop reports:					
Idaho	Boise[7]	120,496	[7]24,518	----	----
Colorado	Uncompahgre Valley[8]	22,287	5.000	----	----
Nebraska-Wyoming	North Platt[9]	17,840	8,588	----	----
New Mexico-Texas	Rio Grande[10]	17,000	10,000	----	----
Total reclamation projects		1,603,638	973,920	----	----

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[1] Limited to project areas, excluding outlying areas (private canals) to which water is furnished under the Warren Act. Data are for calendar year (irrigation season) except on Salt River project data are for corresponding "agricultural year," October, 1915, to November, 1916.

[2] Area Reclamation Service was prepared to supply water.

[3] Irrigated crops. Excludes small areas on few projects cropped by dry farming.

[4] Irrigable area includes so-called "dry lands" given right to rent water temporarily on account of full reservoir. Irrigated acreage includes total are of towns contracting for water; farm area irrigated, 187,905 acres.

[5] Estimated. Crop reports covered 158 irrigated farms with 6,425 acres cropped, part without irrigation, yielding crops valued at $118,990, or $18.52 per acre.

[6] Includes irrigation districts.

[7] Nampa-Meridian and Pioneer Irrigation districts; New York canal lands; 42 project farms; townsites, camps, etc. Irrigated area of districts unknown and not included; considerable water was delivered to them under Warren Act.

[8] Private canals supplied Gunnison water. Irrigated acreage estimated roughly.

[9] North Platte Canal and Colonization Company lands. In addition considerable water was delivered to private canals under Warren Act.

[10] Private canals sold stored water; areas estimated.

Irrigation Districts, 1887-1916.

The Wright Act of 1887. Briefly stated this act sought to confer on farming communities powers of municipalities in the purchase or construction and the operation of irrigation works. These powers included the right of eminent domain, the right to issue bonds against all of the real property within any area organized into an irrigation district, and the right to tax that property for the payment of the cost of any irrigation works acquired or built, and of their operation.

Organization of irrigation districts followed quite rapidly after the passage of the Wright Act, which was approved March 7, 1887 (the act was revised in 1897), and before the end of that year, Turlock, Modesto, Orland and Central districts had been formed in the order named. Seven organized in 1888, including Browns Valley, Madera, Alta and Poso; six in 1889, including Tulare, Anaheim, and Escondido; eleven in 1890, including Selma, Rialto and Perris; thirteen in 1891, including Sunset, Tipton, Linda Vista and Otay, and in 1895 they numbered forty-nine. Many of these for various reasons turned out failures. Only eight districts of the forty-nine are now operating.

Up to July 1, 1915, fifty-seven irrigation districts have been organized in California since 1887, of which nine have been formed since the passage of the act of 1897. Counting eight of the old districts—Browns Valley, Modesto, Turlock, Alta, Tulare, Little Rock Creek, Big Rock Creek and Walnut—seventeen out of the fifty-seven are in existence and twelve are operating. Of the remaining five, Big Rock Creek district has just been revised. Anderson, Cottonwood, La Mesa, Lemon Grove and Spring Valley, and Imperial, although fully organized and although they have all voted bonds, have not yet become operating districts, and Waterford and Alpaugh have not yet adopted plans or voted bonds. Since July 1, 1915, West Side, near Tracy, area 11,500 acres; Terra Bella, surrounding Terra Bella, area 12,500 acres; Lindsay-Strathmore, east of Lindsay and Strathmore, area 18,000 acres; Carmichael, near Fair Oaks, area 1,306 acres; South Lassen, near Doyle, area approximately 22,000 acres. The formation of additional districts is, or recently has been, under consideration at Paradise, Thermalito, Oroville, Willows, Princeton, Ione, Morgan Hill, Merced, Madera, Stratton and Cardiff, San Diego County.*

California Irrigation Districts (22).†

(February 1, 1916.)

District	County
Anderson-Cottonwood	Shasta
Browns Valley	Yuba
Oakdale	Stanislaus
South San Joaquin	San Joaquin
Waterford	Stanislaus
Modesto	Stanislaus
Turlock	Stanislaus
Alta	Fresno, Tulare, Kings
Tulare	Tulare
Alpaugh	Tulare
Little Rock Creek	Los Angeles
Big Rock Creek	Los Angeles
La Mesa, Lemon Cove and Spring Valley	San Diego
San Ysidro	San Diego
Imperial	Imperial
South Lassen	Lassen
Carmichael	Sacramento
West Side	San Joaquin
Lindsay-Strathmore	Tulare
Terra Bella	Tulare

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*For further details see Bulletin No. 2, State Department of Engineering, Irrigation Districts in California, 1887–1915, by Frank Adams, Irrigation Manager, U. S. Department of Agriculture.

†Those who are interested in irrigation projects should obtain a copy of the California Irrigation Act, Chapter 646, approved May 28, 1917.

Private Irrigation Systems.*

The following are a few of the most important of the very large number of private systems in various parts of the state:

California Development Company. This company diverts water from the west bank of the Colorado River close to the Mexican border. Its main canal passes through a portion of the Mexican territory of Lower California, where about 100,000 acres are served. It enters the state again at about sea level, and covers about 400,000 acres, mostly below sea level, in the Imperial Valley, of which upward of 225,000 acres are irrigated. The company does not own any of the land, most of which has been taken up under the Desert Land Act.

San Diego Flume Company. This system, which is typical of the coast region of southern California, irrigates about 7,000 acres to the north and east of the city of San Diego from the San Diego River and the storage reservoirs.

Riverside Water Company and Gage Canal Company. These two systems serve the valuable lands between the south bank of the Santa Ana River and the hills from the section east of Colton, through the Riverside district, in San Bernardino and Riverside counties, but are in no way connected with each other. The value of the entire system, which includes the municipal supply of Riverside, is estimated at $2,500,000, the irrigating portion alone being valued at nearly $1,000,000.

The Gage Canal Company diverts water from the Santa Ana River; its flow is largely augmented during the summer by numerous artesian wells and pumping plants.

Kern County Land Company. The Kern County Land Company is interested in numerous canal projects and corporations, taking water from both sides of Kern River, irrigating lands in what is called the Kern delta, lying south, west, and southwest of Bakersfield. Of these lands there are about 80,000 acres in alfalfa, 12,000 acres in grain, 10,000 acres in pasture, wild grass, and 15,124 acres in orchards, vines, gardens, etc.

Kern Valley Irrigation Company. The Kern Valley Water Company's canal, belonging to Miller & Lux, irrigates the riparian lands lying between Buena Vista Lake and Tulare Lake. About 63,000 acres of this land are in cultivation, mostly in alfalfa.

Fresno and Consolidated Canals Company. These two systems, although kept separate, are operated by the same people and cover practically all the irirgated lands in Fresno County, amounting to about 360,000 acres. The points of diversion for the various canals are all along the west bank of the Kings River, close to where it enters the valley.

The Consolidated includes the Fowler Switch and the Centerville and Kingsburg canals, as well as a majority of the stock of the Emigrant canal. The latter is on the lower Kings River, and diverts water from the river six miles west to Kingsburg to irrigate lands on the Laguna de Tache Rancho, which belongs largely to this company.

The Consolidated has later priorities on the river, and its flow is cut off from the middle of June to August 1, so that its rights are not so valuable as the Fresno canal rights. An annual charge is made for the maintenance of the main canals, amounting to 62½ cents per acre under the Fresno and 75 cents per acre under the Consolidated. The lateral ditches are owned and controlled by the irrigators. No measurements are made to users, each irrigator taking what he needs in accordance with the rights held by him. Considering its area, it is the most highly developed district in the state.

The San Joaquin and Kings River Canal and Irrigation Company. This system diverts water from the west bank of the San Joaquin River about 1½ miles north of the town of Mendota, in Fresno County. It is the oldest large canal in the valley, having been organized in February, 1871. The area tributary to it extends for seventy miles along the west bank of the river, in Fresno, Merced, and Stanislaus counties. The company belongs to Miller & Lux, who have riparian rights on the river, and their own lands are very largely included.

The Crocker-Huffman Land and Water Company. The Merced River furnishes the supply for the 220,000 acres irrigable from its canals. These lands extend from the foothills, near where the river enters the valley, to the country surrounding the city of Merced and between that city and Livingston.

The Butte County and the Sutter County Canals. These two canals are controlled by the same people, using the same main canal, but are separately incorporated. The Butte canal serves the area in Butte County and the Sutter canal serves that in Sutter County. This combined system covers about 80,000 acres, 30,000 in Butte and 50,000 in Sutter County, composed of lands between the Feather River, the Marysville Buttes, and the swamp lands along the Sacramento River south to where the slough which leaves the Feather River near Marysville joints the Sutter basin.

Sacramento Valley Irrigation Company. This is a recent enterprise, backed by large Eastern financial interests, which have secured the rights of the Central Irrigation District by the purchase of all outstanding district bonds for 35 per cent of their par value. They have secured control, also, of 100,000 acres in the above district, and are carrying on extensive work in preparing for the irrigation and drainage of the 225,000 acres which will be included in their system.*

Imperial Valley and the Salton Sea.

The Colorado River is the division line between California and Arizona. It empties into the Gulf of California about sixty miles below Yuma, Arizona. The Colorado has been called the Nile of America, as it is subject to a large rise annually. Its waters have turned the desert lands of Imperial Valley into fertile lands, and more will be reclaimed by the Yuma project of the United States Reclamation Service.

The Salton Sea, or sink, originally formed a part of the Colorado desert, which comprises an area of nearly 2,000 square miles. The desert comprises two fertile valleys, one in Riverside County, known as the Coachella Valley, the other as Imperial Valley, in Imperial County. Salton Sea, which partly fills the sink, lies between the two valleys. On December 31, 1908, its surface was 206 feet below mean sea level, and was nearly 45 miles long and from 9 to 15 miles wide, its maximum depth 67 feet and its area about 443 square miles.

In 1891 the Colorado overflowed into Salton Sink; in 1905 the flood into the sink was repeated on a much larger scale. The old channel of the Alamo River was transformed into a deep, wide gorge, and another channel, now called New River, was formed. Practically all the water received by Salton Sea enters through Alamo and New rivers, but chiefly through the former. These rivers run through Imperial Valley and are drainage channels for waste water from irrigation systems and power plants.

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*See "Irrigation in California," by F. W. Roeding, United States Department of Agriculture. See also the Report of the State Water Commission of California, 1917.

Lakes.

There are several good sized lakes in the northeastern part of the state, namely, Lower Klamath Lake, near Brownell, which has an area of about 21,000 acres; Tule, Clear, Goose, and Upper, Middle and Lower Alkali lakes. All of these are shallow and more or less alkaline. Farther south there are the Eagle and Honey lakes, the water of the latter sweet, and the former rather alkaline.

South of these is Lake Tahoe, at an elevation of 6,000 feet, with a surface area of about 250 square miles, partly in California and partly in Nevada. It has an average depth of about 1,000 feet, and is the source of the Truckee River.

Mono and Owens lakes, like many others, have no outlet, and are strongly alkaline.

Tulare Lake is a shallow body of water, about thirty miles south of Fresno and forty miles northwest of Bakersfield. In 1852–1854 the area was nearly 1,000 square miles, the lake being full, and about 35 feet deep. The flood of 1867 was the last to fill the lake to overflowing and about 1870 it began to recede, until in 1898 the lake bed became practically dry, brought about by the water being diverted for irrigation and light precipitation for a number of years. After partly refilling in 1901 it became completely dry in 1905, and in the early spring of 1906 was entirely under cultivation. On March 15, 1906, the first water reached the lake bed at the mouth of the Kings River and spread over a large area. A few days later water from Kaweah and Tule rivers reached the lake. On June 1 the water was 7 feet deep and covered about 200 square miles. On June 23 overflow water from Kern basin cut through the sand ridge to the south and flowed into the lake. On August 4 the water reached its greatest height for the year 1906, and the lake had an area of about 300 square miles and a maximum depth of 12.7 feet. The total rise of the lake that year was 10.8 feet. In November, 1907, the lake had an area of about 274 square miles, a depth of about 12.4 feet, and an average length of 20 miles, and a width of 13.5 miles. The lake reached its greatest height in July of 1907, when it had maximum depth in the summer of nearly 14 feet. Since then it has been subsiding, and is about 11 feet deep. It is probable that the lake will continue to fluctuate very much as in the past, but whether it is to fill and subside alternately are questions of great importance.

The sudden reappearance of the lake resulted in the loss of millions of dollars, but permanent reclamation is ultimately hoped for.*

Buena Vista Lake is the outlet of Kern River, and is connected with Tulare Lake by sloughs.

Clear Lake, in Lake County, is the only natural body of sweet water in the Coast Range worthy of consideration. It has a surface area of 64 square miles, and is the source of Cache Creek, which enters the Sacramento River near Woodland.

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*For further valuable details, see Water Supply Paper, Part XI, by W. B. Clapp and F. F. Henshaw, United States Geological Survey.

IRRIGATION RESOURCES OF CALIFORNIA.

(Compiled from the Report of the Conservation Commission of California.)

Summary of Agricultural and Irrigated Areas in Northern California.*

Division	Valley agricultural land, acres	Valley plains, acres	Foothill agricultural land, acres	Areas irrigated, acres
Northern coastal counties	503,000			2,290
North central mountain valleys	435,000			99,910
Northeastern plateaus and valleys	867,000			161,850
Feather River valleys	158,000			50,600
Sierra foothills			789,000	45,250
Sacramento Valley	2,659,000	790,000		123,800
Totals	4,622,000	790,000	789,000	483,700

*For further valuable details, see Water Supply Paper, Part XI, by W. B. Clapp and F. F. Henshaw, United States Geological Survey.

Summary of Agricultural and Irrigated Areas in Central California.

Division	Valley agricultural land, acres	Valley plains, acres	Foothill agricultural land, acres	Areas irrigated, acres
Coastal valleys	887,000			87,000
San Joaquin Valley	6,530,000	1,046,000		1,728,975
Sierra foothills above San Joaquin Valley			730,000	10,620
Lands east of the Sierra Nevada	472,000			137,760
Totals	7,889,000	1,046,000	730,000	1,959,355

Summary of Agricultural, Irrigated, and Estimated Irrigable Lands in Southern California.

Area	Agricultural land, acres	Irrigated land, acres	Estimated area that ultimately will be irrigated, acres
Santa Barbara and Ventura counties	509,250	49,656	322,500
Los Angeles and San Gabriel River lands	441,986	167,454	381,500
Santa Ana River lands	876,671	213,407	279,000
San Diego County	363,668	19,880	87,100
Colorado Desert and River valleys	1,550,750	279,600	766,500
Mojave Desert	2,328,000	15,489	113,000
Totals	6,070,325	745,486	1,949,600

NOTE.—For a full description of irrigated areas in the state and of land that it is possible to irrigate, see Report of the Conservation Commission of California, 1912, which contains a large number of valuable maps; also "Irrigation Resources of California and Their Utilization," by Frank Adams, irrigation manager in charge of work in Cailfornia. Experiment Station Bulletin 254.

Summary of Areas Irrigated, 1909–1911, Revised to 1912.

Division	Agricultural areas in irrigation zones, acres	Areas irrigated, acres	Total areas it is estimated may ultimately be irrigated, acres	Approximate per cent of total estimated as ultimately irrigable
Northern California	6,200,200	487,805	3,450,000	56
Central California	9,665,000	1,959,355	4,300,000	44
Southern California	6,000,000	745,486	1,949,600	33
Totals	21,865,200	3,192,646	9,699,600	44

Drainage Area in Square Miles, Annual Flow in Cubic Feet of Rivers and Creeks in Sacramento Valley, 1875–1910.

Streams and point of measurement	Number of years	Drainage area, square miles	Mean flow, cubic feet per second	Total mean annual run-off, acre feet
Sacramento River, Red Bluff	16	9,300	14,300	10,400,000
Sacramento River, Collinsville	7	26,200	35,900	26,000,000
Stony Creek, Fruto	10	600	802	581,000
Feather River, Oroville	9	3,640	8,320	6,020,000
Yuba River, near Smartsville	7	1,220	4,440	3,220,000
Bear River, Van Trent	6	263	574	416,000
Cache Creek, Yolo	8	1,230	960	695,000
Putah Creek, Winters	5	805	712	515,000
American River, Fair Oaks	6	1,910	5,060	3,660,000
Cosumnes River, Michigan Bar	3	524	571	404,000

Drainage Area in Square Miles, Mean and Annual Flow in San Joaquin Valley.*

Rivers, creeks, and measurement at edge of foothills*

San Joaquin River, and north:				
Mokelumne River	12	657	1,380	1,000,000
Calaveras River	6	491	520	377,000
Stanislaus River	18	1,051	1,930	1,400,000
Tuolumne River	21	1,635	2,870	2,080,000
Merced River	15	1,090	1,700	1,228,000
Bear Creek	6	166	65	47,000
Mariposa Creek	6	122	46	33,000
Chowchilla River	6	268	152	110,000
Fresno River	6	272	167	121,000
Upper San Joaquin River	16	1,640	2,850	2,060,000
Totals	11	7,392	11,680	8,456,000
South of San Joaquin River:				
Kings	23	1,740	2,647	1,920,000
Kaweah River	13	520	736	533,000
Tule River	9	266	204	148,000
Kern River	22	2,345	1,063	770,000
Caliente Creek	6	423	191	138,000
Poso Creek	6	289	128	92,000
White Creek	6	90	40	29,000
Deer Creek	6	110	49	35,000
Totals	11	5,738	5,058	3,665,000
Grand totals	11	13,175	16,738	12,121,000

*From records of California Engineering Department.

Irrigation from Underground Waters in the Central Coast Valleys and the San Joaquin Valley.*

Central Coast Valleys in 1909.

Counties	Area irrigated from pumped wells, acres*	Area irrigated from flowing wells, acres*
Alameda	1,125	----------
Contra Costa	68	----------
Monterey	4,428	----------
San Benito	1,812	847
San Francisco	383	----------
San Luis Obispo	109	18
San Mateo	1,057	----------
Santa Clara	15,947	7,415
Santa Cruz	247	2
Totals	25,176	8,282

San Joaquin Valley in 1909 and 1912.

Counties	Area irrigated by pumping plants, 1909, acres*	Area irrigated from flowing wells, 1909, acres*	Total irrigated from ground waters, 1909, acres*	Area reported irrigated in 1912, acres†
Fresno	21,729		21,729	27,620
Kern	4,290	2,097	6,387	12,240
Kings	1,042	11,400	12,442	30,780
Madera	1,663		1,663	9,300
Merced	2,002	262	2,264	4,680
San Joaquin	8,642		8,642	11,380
Stanislaus	5		5	440
Tulare	31,286	6,556	37,942	75,320
Totals	70,659	20,415	91,074	171,760

*From the Census Reports in 1909. †California Conservation Commission.

NOTE.—The increase for the three years, 1909–1912, in the San Joaquin Valley, has averaged 30 per cent per year.

CALIFORNIA RIVERS AND CREEKS IN 1911.

(Compiled from the Reports of the U. S. Geological Survey.)

Rivers or creeks, and canals	Drainage area, square miles	Drainage in second-feet		Total-run-off	
		Maximum	Minimum	Depth in inches on drainage area	Total in acre-feet
Southern Pacific Ocean Drainage Basins.					
Tia Juana River Basin—					
Cottonwood Creek (and conduit), near Jamul	270	97	.0		4,860
Sweetwater River, near Descanso	40	182	.0	2.57	5,490
San Diego River Basin—					
San Diego River (and flume) at Lakeside	208	660	.0	1.31	14,400
San Dieguito River Basin—					
Santa Ysabel Creek, near Escondido	128				3,410
San Luis Rey River, near Pala	318				31,000
Santa Ana River Basin—					
Santa Ana River, near Mentone and Pacific Light and Power Canal	182	1,900	39	9.91	96,500
San Gabriel River and canal, near Azusa	222	9,160	32	23.33	276,000
Los Angeles River Basin—					
Arroyo Seco, near Pasadena	16.4				3,250
Santa Ynez River Basin—					
Santa Ynez River, near Santa Barbara	207				51,500
Santa Ynez River, near Lompoc	725	20,400	30	13.86	537,000
Salinas River Basin—					
Arroyo Seco, near Soledad	215	13,300	11	25.51	292,000
San Francisco Bay Drainage Basins.					
San Joaquin River Basin—					
San Joaquin River, near Friant (formerly Pollasky)	1,640	38,800	297	40.81	3,570,000
Kern River (and power canal) at Isabella	1,220	5,750	245	13.02	846,000
Kern River near Bakersfield	2,345	4,623	281	8.10	1,010,000
Tule River, near Porterville	266	2,780	14	8.58	122,000
Kaweah River, near Three Rivers	520	6,610	62	19.69	546,000
Kings River, near Sanger	1,740	20,500	270	30.58	2,840,000
Merced River, near Merced Falls	1,090	37,200	100	36.32	2,110,000

California Rivers and Creeks—Continued.

Rivers or creeks, and canals	Drainage area, square miles	Drainage in second-feet		Total run-off	
		Maximum	Minimum	Depth in inches on drainage area	Total in acre-feet
San Francisco Bay Drainage Basins—Continued.					
Tuolumne River, near Lagrange (and three canals)	1,500	52,600	16	---------	3,380,000
Modesto Canal, near Lagrange	---------	618	.0	---------	184,000
Turlock Canal, near Lagrange	---------	1,030	.0	---------	302,000
Lagrange Water and Power Co.'s canal, near Lagrange	---------	66	.0	---------	43,400
Stanislaus River, Stanislaus Water Co.'s canal and shell ditch at Knights Ferry	935	36,900	182	46.58	2,320,000
Mokelumne River, near Clements	642	16,700	75	44.29	1,520,000
Cosumnes River at Michigan Bar	524	22,400	24	31.24	874,000
Sacramento River Basin—					
Sacramento River at Antler	461	14,000	245	39.84	979,000
Sacramento River, near Red Bluff (including Goose Lake Basin)	10,400	130,000	5,110	17.27	9,580,000
Pit River, near Ydalpom (includes Goose Lake drainage basin, 1,090 square miles)	6,350	20,600	3,080	11.91	4,040,000
McCloud River at Baird	665	12,600	1,240	46.45	1,650,000
North Fork of Cottonwood Creek at Ono	52	2,460	5	33.21	92,100
Stony Creek, near Fruto	601	15,400	15	16.20	519,000
Little Stony Creek, near Lodoga	102	4,980	2	17.41	94,800
Feather River at Oroville	3,640	75,400	1,060	25.27	6,850,000
Yuba River, near Smartsville	1,220	39,000	410	53.09	3,460,000
North Fork of Yuba River at Goodyear Bar	214	4,570	120	63.74	727,000
North Fork of North Fork of Yuba River at Downieville	71.2	2,290	42	71.10	270,000
Rock Creek at Goodyear Bar	10.8	545	.5	59.40	34,200
Goodyear Creek at Goodyear Bar	12.2	1,180	3	106.95	69,600
Bear River at Van Trent	263	22,200	23	36.43	510,000
American River at Fair Oaks	1,910	69,100	---------	53.01	5,400,000
Rubicon River, near Quintette	198	3,000	5	37.66	398,000
Little South Fork of Rubicon River at mouth, near Quintette (1909-1911)	57.8	616	2	33.72	104,000
Cache Creek at Lower Lake	500	1,410	3	9.47	252,000
Cache Creek at Yolo	1,230	18,400	.0	7.573	496,000
*Northern Pacific Ocean Drainage Basins.**					

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*This includes the Russian River basin, Mattole Creek basin, Eel River basin, Yager Creek, Van Duzen River, Mad River basin, and Redwood Creek basin, but the records available are not sufficient to enable these details to be given.

In addition to these there are a large number of other rivers and streams, the details of which are not so complete as the above. See Water Supply Paper 311, U. S. Geological Survey, 1912, and Water Supply Paper 300, 1913.

Note.—There are four drainage areas in California: The South Pacific Coast area—Tia Juana River, Sweetwater River, San Diego River, San Dieguito River, San Luis Rey River, Santa Ana River, San Gabriel River, Malilu Creek, Santa Ynez River, Santa Maria River, Salinas River; North Pacific Coast area—Russian River, Eel River, Mad River, Klamath River (includes Trinity and Scott rivers); Big Basin area—Susan River, Willow Creek, Truckee River, Owens River; Great Valley area—Sacramento Valley, San Joaquin Valley, San Joaquin River basin, Tulare Lake basin, Kern River basin.

TABLE XXXIII.

Irrigated Farms—Acreage and Cost, 1910.

(Compiled from the Reports of the Bureau of the Census.)

Counties	Number of farms irrigated	Acreage irrigated	Acreage capable of irrigation, 1910	Acreage capable of irrigation in projects	Cost of enterprises to July 1, 1910	Average cost per acre capable irrigation, 1910
Alameda	50	1,859	1,872	2,605	$57,156	$30 53
Alpine	32	3,349	3,399	3,435	7,493	2 20
Amador	73	826	3,973	4,139	265,608	66 85
Butte	556	28,754	115,075	233,500	1,231,894	10 71
Calaveras	154	1,275	3,161	3,919	121,033	38 29
Colusa	112	4,276	16,541	18,783	76,112	4 60
Contra Costa	78	26,856	32,562	32,640	90,503	2 78
Del Norte	----------	----------	----------	----------	----------	----------
El Dorado	244	5,122	5,501	20,264	346,939	63 07
Fresno	5,310	402,318	560,326	633,652	1,898,460	3 39
Glenn	196	5,661	16,804	220,664	1,519,561	90 43
Humboldt	33	208	333	966	29,027	87 17
Imperial	1,250	190,711	242,000	375,000	4,955,272	20 48
Inyo	408	65,163	71,815	92,319	962,698	13 41
Kern	876	190,034	217,418	402,806	1,788,635	8 23
Kings	1,126	190,949	289,523	310,523	687,381	2 37
Lake	43	582	828	1,268	12,124	14 64
Lassen	355	77,079	89,815	149,530	884,965	9 85
Los Angeles	4,669	145,586	183,506	241,794	7,817,023	42 60
Madera	158	38,705	51,230	82,321	512,098	10 00
Marin	6	67	71	71	3,380	47 61
Mariposa	56	376	546	767	13,440	24 62
Mendocino	39	371	590	1,365	30,297	51 35
Merced	1,417	151,998	248,670	281,719	3,748,211	15 07
Modoc	437	82,075	89,476	124,166	301,040	3 36
Mono	76	49,027	50,007	84,973	64,282	1 29
Monterey	258	15,056	27,176	29,914	495,916	18 25
Napa	36	1,191	2,035	2,443	53,948	26 51
Nevada	300	3,839	4,259	5,267	1,569,028	368 40
Orange	2,215	55,056	63,486	71,444	1,948,246	30 69
Placer	618	16,845	23,365	61,751	2,798,740	119 78
Plumas	151	36,602	37,529	37,901	107,118	2 85
Riverside	2,174	71,436	103,233	210,452	5,648,469	54 72
Sacramento	1,053	53,683	69,970	74,588	1,452,471	20 76
San Benito	240	7,186	13,790	20,067	177,924	12 90
San Bernardino	2,463	70,278	86,107	152,415	9,416,960	109 36
San Diego	890	24,944	31,205	45,535	3,753,127	120 27
San Francisco	25	383	383	383	21,975	57 38
San Joaquin	1,452	59,811	77,083	173,563	1,689,720	21 92
San Luis Obispo	91	1,687	2,416	2,539	32,311	13 37
San Mateo	75	3,648	3,653	3,983	90.921	24 89
Santa Barbara	137	12,012	13,572	13,603	307,186	27 28
Santa Clara	1,101	37,637	50,939	60,140	1,337,216	26 25
Santa Cruz	106	1,201	1,313	2,232	76,621	58 36
Shasta	639	33,004	36,564	72,653	430,766	11 78
Sierra	94	17,504	17,505	18,249	69,650	3 98
Siskiyou	636	60,301	66,866	79,161	370,627	5 54
Solano	150	3,610	7,160	8,192	135,532	18 93
Sonoma	38	631	761	951	13,801	18 14
Stanislaus	1,911	84,015	141,785	340,914	4,051,870	28 58
Sutter	39	1,173	1,361	1,959	18,800	13 81
Tehama	366	14,281	23,167	36,020	263,055	11 35
Trinity	201	6,324	7,127	9,513	173,414	24 33
Tulare	3,048	265,404	337,938	466,735	5,634,379	16 67
Tuolumne	157	2,035	2,083	5,958	180,474	84 64
Ventura	489	25,273	49,407	56,357	2,262,205	45 79
Yolo	333	11,754	14,697	55,967	311,660	21 21
Yuba	112	3,073	6,401	46,322	198,268	30 97
Totals	39,352	2,664,104	3,619,378	5,490,360	$72,580,030	$20 05

TABLE XXXIV.

Irrigated Farms—Main Ditches, Laterals, Flowing Wells and Pumped Wells, 1910.

Counties	Main ditches		Laterals		Wells	
	Number	Length, miles	Number	Length, miles	Number of flowing wells	Number of pumped wells
Alameda	49	21				56
Alpine	25	34	3	1		
Amador	55	185	12	56		
Butte	135	270	145	170		46
Calaveras	148	124	32	31	6	7
Colusa	38	44	10	7		3
Contra Costa	176	172			1	26
Del Norte						
El Dorado	56	285	25	55		
Fresno	254	831	688	1,354	3	855
Glenn	50	136	554	1,073		105
Humboldt	33	26	4	2		2
Imperial	12	117	179	890		
Inyo	184	396	326	168	10	1
Kern	178	441	118	257	25	140
Kings	27	137	51	159	75	20
Lake	44	26	21	2	1	3
Lassen	295	368	263	116		
Los Angeles	601	800	494	500	376	1,673
Madera	34	79	30	294		33
Marin	5	5				1
Mariposa	49	21				2
Mendocino	33	19	8	6		6
Merced	45	261	353	352	29	78
Modoc	446	637	490	175	45	2
Mono	85	172	101	65		
Monterey	106	223	23	32		102
Napa	26	8	3	3		2
Nevada	110	236	46	32		5
Orange	309	180	115	246	588	580
Placer	35	194	46	108		2
Plumas	147	201	62	16	3	
Riverside	301	500	262	288	553	792
Sacramento	213	238	5	8		1,168
San Benito	64	61	12	33		87
San Bernardino	291	466	237	283	79	449
San Diego	288	259	244	140		438
San Francisco	24	7				39
San Joaquin	298	308	49	192		1,618
San Luis Obispo	51	42	5	3	4	12
San Mateo	57	58				40
Santa Barbara	76	75	4	5	7	113
Santa Clara	458	228	39	27	438	800
Santa Cruz	81	41			2	58
Shasta	446	678	130	81	2	34
Sierra	119	150	4	1		
Siskiyou	595	688	172	41		3
Solano	20	22				125
Sonoma	32	21				11
Stanislaus	23	153	34	274		3
Sutter	13	6				18
Tehama	136	164	41	40	1	141
Trinity	208	228	41	13		1
Tulare	752	1,033	577	629	79	794
Tuolumne	62	153	11	24	2	4
Ventura	148	177	53	87	32	157
Yolo	8	87	8	83		58
Yuba	36	128	13	87		11
Totals	8,590	12,620	6,143	8,590	2,361	10,724

PART VIII.

PETROLEUM, NATURAL GAS, GASOLINE, MINERALS AND MINERAL SPRINGS.

Petroleum by Counties and Fields; Oil Land Situation in California; Production 1890-1916; Production in Other States; World's Output; Imports and Exports; Natural Gas; Gasoline; Minerals 1904-1915; Production of Minerals by Counties; Mineral Springs.

PETROLEUM.*

The existence of petroleum in California has long been known. The native Indians used it in the form of asphaltum for various purposes, and it was utilized by the Catholic fathers for roofing their missions and other buildings. For nearly half a century Russia was the largest producer of petroleum in the world, but now occupies the second place, the first being held by California.

Duration of Oil Fields.

The National Conservation Committee in 1908 estimated the petroleum area in California as 850 square miles, and the natural gas area as 310 square miles.

A vast system of pipe lines has been constructed from the various fields to the coast, the total length being about 1,782 miles. The principal pipe lines are owned by six large companies. The Standard Oil Company lines serve the San Joaquin Valley, Los Angeles and Orange counties, Ventura and Santa Barbara counties, or about 464 miles. The Producers' Transportation Company serves the San Joaquin Valley, with 221 miles. The Union Oil Company serves Santa Barbara, Ventura, Los Angeles and Orange counties with a total length of about 160 miles.

The Associated Pipe Line Company goes from the Kern River and Sunset fields to Port Costa, a total of 559 miles. The Associated Oil Company pipe lines go from Coalinga to Monterey, and from Santa Maria to Gaviota, or 171 miles. The General Pipe Line Company carries oil from Sunset to Los Angeles, with a branch line to Mojave. It crosses the Tehachapi Mountains at a height of 4,215 feet above sea level, and is 207 miles in length.

Petroleum Reserves in California.

Two reserves of public lands have been established to assure the Navy a supply of oil in case of need. These reserves are in Elk Hills and the Buena Vista Hills, Kern County. The public lands within these areas have been withdrawn from all forms of entry during the last few years, and in 1912 a special reservation for naval purposes was made.

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*For the early development of California oil fields, see Report for 1913, pages 176, 177, and 1914, pages 162–167.

The Oil Land Situation in California.*

The Commissioner of the General Land Office reports that during the year 1916 substantial and material progress has been made in the investigation and adjudication of the pending cases in the California oil reserves. The investigations in a large number of cases were completed, appropriate action taken upon the reports submitted, and proceedings challenging the validity of pending mineral applications were directed in 65 cases, involving 15,858.94 acres. At the present time there are 86 cases, involving 20,694.88 acres, pending under adverse proceedings. Two mineral entries with an area of 409.52 acres were canceled; 22 mineral entries, with an area of 3,058.85 acres were patented and 20 other entries, covering 3,405.46 acres, have been clear-listed but not patented.

There are 22 cases, involving 6,814.54 acres, now pending for field investigation. There are 8 applications, involving 1,400 acres, in which reports have been received, which have not been acted on, and 14 mineral entries which are pending under adverse suits in the local courts or other action.

Hearing was held and completed in one case involving 120 acres, and 11 others were set for trial, and in some of these testimony has been taken but the cases have not yet been completed.

There are now pending in court seven suits, involving 168,051.30 acres, to set aside railroad patents alleged to have been secured with the knowledge of the oil deposits contained in the land, and to restore to the public domain these lands, subject to such disposition as may be applicable thereto under the law. One of these cases, the Elk Hills case, was passed upon this year by the circuit court of appeals and the judgment of the lower court in favor of the government was upheld.

During this fiscal year 19 trespass suits and suits to quiet title in the government and for an accounting, etc., were brought. The acreage involved is 4,483.99. Nine of these suits involve lands covered by pending mineral applications and 10 embrace unentered lands. With the 6 suits brought previously, the total number of suits brought is 25. Decisions in favor of the government have been had in 6 cases, involving 916.79 acres. No decision adverse to the government has yet been rendered in any of the suits brought. At the present time 19 of these suits are pending in the courts in which no decision has been rendered.

There has been some reduction in the area covered by oil withdrawals in California; at the present time the total number of acres in the oil reserves is 1,361,114.65. Of this, 899,103.78 acres are patented, 38,285.61 are in pending mineral entries, 84,862.18 are in agricultural entries, and 338,863.08 are either unentered or are in agricultural entries and selections made subject to the act of congress which reserves the oil and gas to the United States.

The following statistics regarding the two naval petroleum reserves in California will be of interest: There are 38,060.71 acres in naval reserve No. 1, situated in the Elk Hills, Kern County; of these, 12,091.09 are patented without oil and gas reservation to the United States; 21,436.67 acres are unentered. There are 10 mineral entries, embracing 4,532.95 acres, pending before this office; against 7 adverse proceedings which have been brought by this office. One of the mineral entries is pending under private contest, and the other two are involved in adverse suits in the local courts. The total area in naval petroleum reserve No. 2 in the Buena Vista Hills, Kern County, is 30,180.67 acres; 19,090.94 acres have been patented without oil and gas reservation; 3,706.13 acres are unentered; and there are 33 mineral entries, with an area of 7,383.60 acres, pending before the office—19 of these are pending under adverse proceedings by the government; 12 has been clear listed, but not patented; 1 is pending under an adverse suit in the local courts; and 1 is pending in this office for action on a special agent's report.

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*Report of the Commissioner of the General Land Office, Washington, dated June 30, 1916, pages 3-6.

The data given with respect to the lands and entries in the two naval petroleum reserves are included in the statistics previously given herein.

California Largest Producer.

California still maintains the lead as the largest producer of petroleum in the United States. In the world's production the United States has been first for many years, and Russia which was formerly first, now occupies the second place. In 1914, the production in the United States was 265,762,535 barrels, and Russia 67,020,522 barrels.

The estimated production of the United States in 1915, is 267,400,000 barrels. As a result of the overproduction in 1914, the field activity in California was reduced to the lowest practicable minimum in 1915, the estimated production being about 91,000,000 barrels. The number of new oil wells drilled in California during 1915 was only about 240, as compared with 400 drilled in 1914.

Proved Oil Land.

The present extent of proved oil land in California has been determined recently by the State Mining Bureau in the most accurate and detailed study ever given to the subject. The total is 126 square miles, or 80,702 acres, of which 55,842 acres are in Kern County alone. Fresno County is second on the list with 12,218 acres, and Santa Barbara County third with 6,030 acres. The other counties in order of their rank are Orange, Los Angeles, Ventura, San Luis Obispo, and Santa Clara. It is worthy of notice that the total area of proved oil land is most insignificant in comparison with the area of the entire state, being less than one one-thousandth part, and yet the oil business is one of the state's most important industries.

Estimates of the total amount of oil which can be recovered from the land are little better than pure guesses but it does seem most probable that the average acre will ultimately yield much less than fifty thousand barrels.

The acreage of the various oilfields in 1915 are as follows:

By counties	Acres	By fields	Acres
Fresno	12,218	Coalinga	12,218
Kern	55,842	Lost Hills-Belridge	3,115
Santa Barbara	6,030	McKittrick	1,086
Ventura	749	Sunset-Midway	44,839
Los Angeles	2.326	Kern River	6,974
Orange	3,305	Santa Maria and Lompoc	5,900
San Luis Obispo	202	Summerland	130
Santa Clara	30	Ventura	749
		Salt Lake	949
		Newhall	117
		Los Angeles city	380
		Whittier-Fullerton	4,185
		Arroyo Grande	30
		Sargent	30
Total	80,702	Total	80,702

Production and Value of Oil by Counties, 1914–1915.

(From the California State Mining Bureau.)

County	1914		1915	
	Barrels	Value	Barrels	Value
Fresno	15,952,190	$7,210,389	14,021,025	$7,641,459
Kern	65,332,633	26,721,046	54,810,669	23,184,913
Los Angeles	3,558,690	1,957,279	2,931,098	1,843,661
Orange	12,758,678	8.612,108	12,715,457	6,510,314
Santa Barbara	4,325,787	1,989,862	5,634,534	3,442,700
Santa Clara	10,000	5,300	16,617	11,067
Ventura	943,929	991,125	1,017,220	869,723
Totals	102,881,907	$47,487,109	91,146,620	$43,503,837

Average Price of Oil, by Counties, in Cents per Barrel.

County	1914	1915	Increase+ Decrease−
Fresno	45.2¢	54.5¢	9.3¢+
Kern	40.9¢	42.3¢	1.4¢+
Los Angeles	55.0¢	62.9¢	7.9¢+
Orange	67.5¢	51.2¢	16.3¢—
Santa Barbara	46.0¢	61.1¢	15.1¢+
Santa Clara	53.0¢	66.6¢	13.6¢+
Ventura	105.0¢	85.5¢	19.5¢—
State average	46.1¢	47.9¢	1.8¢+

Production by Fields.
(Barrels 42 gallons.)

Field	1913	1914	1915
Kern River	10,499,509	7,227,422	8,034,974
McKittrick	4,520,549	3,871,352	3,552,801
Midway-Sunset	39,277,370	49,408,493	39,318,093
Lost Hills-Belridge	5,272,630	4,825,366	4,318,550
Coalinga	18,696,110	15,952,190	13,548,159
Santa Maria-Lompoc	4,843,683	4,266,387	4,536,840
Ventura County-Newhall	1,009,633	943,929	1,036,305
Los Angeles-Salt Lake	2,942,684	2,456,937	2,110,133
Whittier-Fullerton	10,685,146	13,860,431	13,030,549
Summerland	59,400	59,400	53,000
Watsonville	20,000	10,000	27,375
Totals	97,776,714	102,881,907	89,566,779

Summary of Field Operations and Production, 1916.*

Field	Rigs completed during year	Wells		Production	
		Completed during year	Abandoned during year	For year	Per day
Kern River	103	106	5	8,402,525	22,958
McKittrick	38	21	5	3,230,644	8,827
Midway-Sunset	294	209	15	38,925,476	106,354
Lost Hills-Belridge	148	114	4	4,852,431	13,258
Coalinga	49	36	11	14,381,493	39,294
Lompoc and Santa Maria	40	11	12	4,422,410	12,083
Ventura County and Newhall	23	12	7	1,122,033	3,066
Los Angeles and Salt Lake	3	2	11	1,721,453	4,703
Whittier-Fullerton	75	56	10	14,679,672	40,108
Summerland	--------	--------	--------	56,775	155
Watsonville	--------	--------	--------	27,450	75
Totals	773	567	80	91,822,362	250,881

Total crude oil stocks, December 31, 1915	57,147,051 bbls.
Total crude oil stocks, December 31, 1916	44,036,190 bbls.
Decrease during year	13,110,861 bbls
Daily decrease during year	35,822 bbls.

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*From the Standard Oil Bulletin.

Well Operations by Fields, 1914.

Field	Producing Dec., 1913	Producing Dec., 1914	Increase	Decrease	Completed	Abandoned
Kern River	1,397	1,385	--------	12	15	2
McKittrick	254	251	--------	3	9	5
Midway-Sunset	1,214	1,376	162	--------	206	12
Lost Hills-Belridge	185	240	55	--------	49	10
Coalinga	867	815	--------	52	30	11
Santa Maria-Lompoc	221	235	14	--------	6	2
Ventura-Newhall	409	442	33	--------	35	3
Los Angeles-Salt Lake	682	687	5	--------	9	8
Whittier-Fullerton	514	568	54	--------	62	2
Summerland	122	102	--------	20	--------	--------
Watsonville	5	5	--------	--------	--------	--------
Totals	5,870	6,106	236	--------	421	55

Well Operations, by Fields, 1915.

Field	Producing, Dec., 1914	Producing, Dec., 1915	Increase+ Decrease−	Completed	Abandoned
Kern River	1,385	1,684	299+	11	----------
McKittrick	251	276	25+	2	4
Midway-Sunset	1,376	1,418	42+	125	11
Lost Hills-Belridge	240	248	8+	15	5
Coalinga	815	804	11—	14	8
Santa Maria-Lompoc	235	237	2+	6	3
Ventura County and Newhall	442	444	2+	11	1
Los Angeles and Salt Lake	687	691	4+	----------	----------
Whittier-Fullerton	568	613	45+	----------	----------
Summerland	102	112	10+	----------	----------
Watsonville	5	5	----------	----------	----------
Totals	6,106	6,532	426+	184	32

Gas oil and fuel oil	672,931,878	18,543,976	807,858,733	24,769,248
Totals	2,187,340,610	$133,693,275	2,443,448,043	$166,416,922

SUMMARY.

Production of Petroleum in California, 1900–1916.

Year	Barrels of 42 gallons	Value	Year	Barrels of 42 gallons	Value
1900	4,329,950	$4,152,928	1909	58,191,723	$32,398,187
1901	7,710,315	2,961,102	1910	73,010,560	35,749,473
1902	14,356,910	4,692,189	1911	78,195,139	40,552,088
1903	24,340,839	7,313,271	1912	90,073,202	43,000,000
1904	29,736,003	8,317,809	1913	98,494,532	48,578,014
1905	34,275,701	9,007,820	1914	102,881,907	47,487,109
1906	32,624,000	9,238,020	1915	91,146,620	43,503,837
1907	40,311,171	16,783,943	1916 (estimated)	91,822,362	------------
1908	48,306,910	26,566,181			

The estimates of the output do not always agree, as some authorities include the quantity used in the field, which amounts to about 5,000,000 gallons annually.

The proportion of heavy and light oil produced in the various fields is shown by the following figures: Oil below 18° Baumé may be considered as largely unrefinable, or fuel, oil; while the lighter oils yield varying amounts of refined products and a very large proportion of residuum or fuel oil. A very few years ago, the total amount of heavy oil was in excess of the light oil.

Production of Light and Heavy Oils by Fields.

Field	Under 18°, barrels	18° and over, barrels	Totals, barrels
Kern River	8,034,974	------------	8,034,974
McKittrick	3,552,801	------------	3,552,801
Midway-Sunset	10,363,414	28,954,679	39,318,093
Lost Hills-Belridge	11,133	4,307,417	4,318,550
Coalinga	5,968,295	7,579,864	13,548,159
Lompoc and Santa Maria	699,740	3,837,100	4,536,840
Ventura County and Newhall	101,397	934,908	1,036,305
Los Angeles and Salt Lake	1,979,938	130,195	2,110,133
Whittier-Fullerton	373,279	12,657,270	13,030,549
Summerland	53,000	------------	53,000
Watsonville	------------	27,375	27,375
Totals	31,137,971	58,428,808	89,566,779

Of the fourteen states now producing petroleum, the date of first production was as follows:

State	Year	Barrels
Pennsylvania and New York	1859	2,000
California	1876	12,000
West Virginia	1876	120,000
Ohio	1876	31,763
Kentucky and Tennessee	1883	4,755
Colorado	1887	76,295
Indiana	1889	33,375
Illinois	1889	1,460
Kansas	1889	500
Texas	1889	48
Missouri	1889	20
Oklahoma	1891	30
Wyoming	1894	2,369
Louisiana	1902	548,617

Exports of Petroleum from the United States.

The quantity of oil exported from the United States is enormous, and has increased from 967,262,000 gallons in 1900 to 2,034,826,481 gallons in 1915, and the value has increased during this period from $68,247,000 to $128,781,641.

Imports of Petroleum in 1900–1916.

Year	Free gallons	Value	Dutiable gallons	Value
1900	2,354,720	$217,405	19,509	$3,042
1910	13,693,228	609.400	*2,156	644
1911	38,775,884	2,143,661		
1912	160,502,114	3,654,453		
1913	529,737,973	9,216,980		
1914	791,137,399	13,665,940		
1915	662,185,502	9,790,932		
1916	871,473,103	12,512,229		

*From July 1 to August 5. All mineral oils became free on August 6, 1909. Note the enormous increase of 369,235,859 gallons in 1913, after being placed on the free list.

IMPORTS AND EXPORTS OF PETROLEUM IN 1915–1916.

Imports.

	1915		1916	
	Gallons	Value	Gallons	Value
Crude	653,707,517	$8,918,096	869,369,363	$12,205,762
Benzine, gasoline, and naphtha	7,920,504	762,556	7,738	2,608
All others	557,481	110,280	2,096,002	303,859
Totals	662,185,502	$9,790,932	871,473,103	$12.512,229

Exports of Domestic Petroleum.

	1915		1916	
	Gallons	Value	Gallons	Value
Mineral, crude, including all natural oils, without regard to gravity	152,514.129	$4,911,634	163,732,589	$5,754,084
Refined or manufactured—				
Illuminating oil	886,316,740	$53,607,082	823,143,138	$52,283,057
Lubricating and heavy paraffin oil	214.429,099	28.499.786	250,395,439	37,452,084
Gas oil and fuel oil	672,931,878	18,543,976	897,858,733	24,769,248
Naphthas and all lighter products of distillation:				
Gasoline	156,860,666	17,603,317	100,148,554	16,297,561
All other	94,335,128	10,296,928	194,631,255	29,472,713
Residuum, tar, and all from which the light bodies have been distilled:				
All others	9,952.970	230,552	13,538,335	388,175
Totals	2,187,340,610	$133,693,275	2,443,448,043	$166,416,922

It may be noted that although the production of petroleum in this country has developed into such huge quantities, the imports are very considerable and increasing.

NATURAL GAS.

Since 1889, when natural gas was first produced and used in California, the natural gas industry has become of great importance, and to the United States belongs the credit of making natural gas a commercial product.

Since the discovery of gas in the Buena Vista Hills, near Taft, in Kern County, the natural gas industry of California has continued to improve.

In 1913 the pipe line from the Midway field to southern California was completed at a great cost, and natural gas was introduced into Los Angeles and other towns and cities in the adjacent territory.

It is estimated that 11,034,597,000 cubic feet of gas, valued at $1,883,450, or 17.07 cents per thousand cubic feet, was produced in this state and consumed in 1913, as compared with 9,354,428,000 cubic feet valued at $1,134,456, or 12.13 cents per thousand cubic feet in 1912. The wells with greatest capacity and highest pressure are located in Kern County, where at the close of 1913 there were 27 gas wells, which range in depth from 1,600 to 2,782 feet, and have a pressure of from 250 to 960 pounds. Considerable gas is produced from the oil wells of Orange and Santa Barbara counties, where it is largely used for field purposes, and as this gas is very rich in gasoline, several plants have been installed in these counties for the production of gasoline, which has become an important industry in this state, the production in 1913 being second only to Oklahoma. The counties in which gas is produced are: Humboldt, Kern, Orange, Los Angeles, Sacramento, San Joaquin, Santa Barbara, Santa Clara, Solano, Tehama, Ventura, and Fresno. The number of productive gas wells in the state at the close of 1913 was 72. The value of gas as here shown is open to considerable question but is certainly not too high. The average price is about 6 cents per 1,000 cubic feet. Seven thousand cubic feet of gas is about equal to one barrel of oil in heating value.

Natural Gas, 1915.

County	M cubic feet	Value
Fresno	2,894,834	$253,906
Kern	12,163,461	737,638
Kings	258	608
Los Angeles	1,729,035	120,783
Orange	1,243,301	81,753
San Joaquin	161,923	143,974
Santa Barbara	3,193,368	279,697
Ventura	491,879	29,670
Humboldt, Sacramento and Solano*	114,833	58,451
Totals	21,992,892	$1,706,480

*Combined to conceal an individual producer in each.

Natural Gas Produced in California, 1905–1915.

Year	Value
1905	$133,696
1906	134,560
1907	168,397
1908	307,652
1909	446,933
1910	476,697
1911	800,714
1912	1,134,456
1913	1,883,450
1914	1,049,470
1915	1,706,480

Gasoline.

The marketed gasoline extracted from natural gas in California in 1914 amounted to 7,581,309 gallons, valued at $633,517, an increase of 4,120,562 gallons, or 119 per cent, in quantity and $257,290, or 68 per cent, in value over the production credited to the state in 1913. The average price received for the output in 1914 was 8.36 cents a gallon, as compared with 10.87 cents in 1913, the decline in this respect being less in California than in the Appalachian and Mid-Continent states because of the fact that the California product is wholly absorbed by local markets, where competition with gasoline derived from crude petroleum is less keen than in the states east of the Rocky Mountains.

There were in operation in 1915 a total of 20 plants making casinghead gasoline by compression, with a total daily capacity estimated at 38,175 gallons, distributed as follows:

Field	Number plants	Gallons daily
Coalinga	1	1,450
Fullerton	6	9,250
Midway	1	2,000
Santa Maria	8	19,600
Salt Lake (Los Angeles)	3	3,575
Ventura	1	2,300
Totals	20	38,175

At Santa Maria, after the gasoline is extracted, the remaining "dry gas" is taken into the pipe lines of the Santa Maria Gas and Power Company, by whom it is distributed to consumers, both domestic and commercial.

The largest natural gas field of commercial importance thus far developed in California is in the Midway district, followed by Santa Barbara, Los Angeles and Orange counties, in the order named. The Southern California Gas Company operates a 12-inch pipe line from the Midway field, a distance of 107 miles, to Los Angeles, where it supplies gas to local distributing companies. The California Natural Gas Company supplies gas to consumers in the Midway field and to local distributing companies at Fellows, Taft, Maricopa and Bakersfield. The Santa Maria Gas and Power Company distributes gas around Santa Maria, from wells in the neighboring oil fields.

Marketed Production of Gasoline from Natural Gas in California, in 1914, by Counties.

County	Plants		Gasoline produced	
	Number in operation	Daily capacity, gallons	Quantity, gallons	Value
Santa Barbara	8	16,378	4,225,334	$323,701
Orange	4	10,609	2,403,059	222,334
Los Angeles	4	1,839	570,104	59,453
Fresno	1	3,534	382,812	28,029
Ventura	1			
Kern	1			
Totals	19	32,360	7,581,309	$633,517

MINERALS.

California is rich in minerals, but as yet comparatively little has been done, with the exception of gold mining, and in more recent years in the petroleum fields, to develop its vast resources. The great difficulty in the way of opening up some of these valuable deposits is the want of transportation facilities.

Borax, magnesite, and chrome production in the United States come solely from California. Eighty per cent of the domestic supply of quicksilver and platinum is mined in this state. California leads all other states in the Union in the value of petroleum and gold produced; is first of all states west of the Mississippi in the value of her total mineral production, and is only outranked by a few of the great iron and coal producing states of the East. The value of the total mineral output for 1914 is estimated at $93,436,553.

In 1914 there were forty-two different mineral substances, and of the 58 counties all but Alpine and Sutter, contributed some mineral product. The total value was less than that of 1913 by $5,208,086, owing to general depression in business. The mineral products which fell off most, were petroleum, cement, copper, and stone of various sorts. The decrease in the price of oil caused a decrease in total value, but there was an increase in the amount produced.

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas and petroleum, the combined values of which make up approximately 50 per cent of the state's entire mineral industry. Comparison of values during 1914 and 1915 is shown in the following table:*

Substance	1914	1915	Increase+ Decrease−
Coal	$28,806	$26,662	$2,144—
Natural gas	1,049,470	1,706,480	657,010+
Petroleum	47,487,109	43,503,837	3,983,272—
Totals	$48,565,385	$45,236,979	$3,328,406—

Total Gold Production of California, 1909-1916.

Gold is more widely distributed than any other substance thus far mined in California, thirty counties out of the fifty-eight in the state showing a gold yield in 1914 and gold is known to exist in several others. Gold was discovered by James W. Marshall, on January 24, 1848, at Sutter's Mill, near Coloma, El Dorado County. The value of the gold produced since that year, until 1916, amounts to about $1,653,683,696.

California Minerals in 1916 Break Records.

The statistical division of the State Mining Bureau, under the direction of Fletcher Hamilton, State Mineralogist, has made a careful estimate of the mineral production of the state for the year 1916. This estimate is in advance of the actual figures which will be available later. The indications are that the total for all products, metallic and nonmetallic, will reach a figure approximating $119,000,000, as against a total of $96,663,369 in 1915, and for the first time in the history of the state exceeding $100,000,000 in value. The major portion of the increase is due to copper. The output of that metal increased about 50 per cent in quantity and over 60 per cent in price per pound, more than doubling the total value of the year's product. That gold practically held its own in spite of the strike shut-down on the Mother Lode in Amador County, and an increase of about a half a million in silver are attributable largely to the increase in copper output. Of the other important metals, tungsten, lead, zinc and quicksilver, all made noteworthy gains. The sales of the last named were characterized by previously unheard-of high prices during the first four months of the year, but later settled down to an average around $75 per flask for the last six months. The quantity will probably reach 20,000 flasks valued at $2,500,000.

Petroleum shows an increase of about 2,000,000 barrels in quantity and some $5,000,000 in value. As to chrome, magnesite and manganese, it is too early yet to obtain any very definite idea of the amounts; but it seems likely that the total of the three will reach at least $1,500,000. There are two new items added to the commercially productive list this year: molybdenum and strontium, small amounts of which were sold.

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*The complete output and value of minerals for 1916 has not yet been issued.

The estimated values for 1916 are tabulated as follows:

$22,500,000	gold.
1,400,000	silver.
4,000,000	tungsten.
17,000,000	copper.
1,000,000	lead.
2,000,000	zinc.
2,500,000	quicksilver.
59,000	antimony, iron, molybdenum, platinum.
49,000,000	petroleum.
1,500,000	chrome, magnesite, manganese.
1,800,000	natural gas.
13,200,000	brick, cement, building stone, crushed rock, etc.
1,255,000	miscellaneous "industrial" materials.
2,100,000	salines.
$119,314,000	total.

The following summaries are compiled from the reports of the State Mining Bureau:

SUMMARY OF SOME SELECTED MINERAL PRODUCTS.

Gold, 1894–1915.

Year	Value	Year	Value
1894	$13,923,281	1905	$19,197,043
1895	15,334,317	1906	18,732,452
1896	17,181,562	1907	16,727,928
1897	15,871,401	1908	18,761,559
1898	15,906,478	1909	20,237,870
1899	15,336,031	1910	19,715,440
1900	15,863,355	1911	19,738,908
1901	16,989,044	1912	19,713,478
1902	16,910,320	1913	20,406,958
1903	16,471,264	1914	20,775,000
1904	19,109,600	1915	22,442,296

Amador and Nevada each produced gold of a value exceeding $3,000,000 in 1915, Yuba being third with a production of $2,703,710, and Sacramento fourth with $2,131,813.

Silver, 1904–1915.

Year	Value	Year	Value
1904	$873,525	1911	$673,336
1905	678,494	1912	799,584
1906	817,830	1913	832,553
1907	751,646	1914	814,230
1908	873,057	1915	851,129
1909	896,250	1916 (estimated)	22,500,000
1910	993,646		

The total value of silver obtained 1887–1915 is estimated at $23.715,151. The average price for the year 1914 was 54.8 cents per ounce; in 1915 it rose to 75 cents, but in May, 1916, had fallen to 66 cents.

Silver is found in thirty-three counties, Shasta being the leading producer, and Inyo County second.

Quicksilver, 1904–1916.

Year	Flasks	Value	Year	Flasks	Value
1904	28,876	$1,086,323	1911	19,109	$879,205
1905	24,655	886,081	1912	20,600	866,024
1906	19,516	712,334	1913	15,661	630,042
1907	17,379	663,178	1914	11,373	557,846
1908	18,039	763,520	1915	14,199	1,157,449
1909	16,217	773,788	1916	21,400	2,000,900
1910	17,665	799,002			

For many years California has been, and still is, producing from 70 per cent to 80 per cent of the quicksilver yield of the United States. This metal is absolutely essential from a military standpoint, as there has not yet been produced a commercial substitute for it in the manufacture of fulminating caps for explosives.

The returns on the production of quicksilver in California for the calendar year 1916 have now practically all been received, and show a considerable increase both in quantity and value over the previous year. The total number of flasks (containing 75 pounds) amounted to 21,400 and were sold for a total of $2,000,900 by the mine operators. The quotations varied from the high level of $300 per flask in February to an average around $75 for the last six months of the year. Because of the rapid fluctuations in prices during the first six months, quotations did not always mean sales. For this reason, though the average of quotations for the year was $125, the actual sales by the producers averaged but $93.50. Nearly 50 per cent of the above total came from San Benito County, with about 20 per cent from Santa Clara County, and the balance made up of smaller amounts, from Lake, Napa, San Luis Obispo, Monterey, Solano, and a few others.

With the exception of a small tonnage of chrome from Oregon in 1916, and of magnesite from Washington in 1917, California has been the sole source of these two minerals in the United States. California is one of the two main producing tungsten states of the Union. This metal is especially valuable in the manufacture of alleys for highspeed tool steels.

Borax, 1904–1915.

Year	Pounds	Value	Year	Pounds	Value
1904	91,294,000	$698,810	1910	33,656,000	$1,177,960
1905	97,068,000	1,019,158	1911	50,945,000	1,456,672
1906	116,346,000	1,182,410	1912	42,135,000	1,122,713
1907	106,825,000	1,200,913	1913	58,051,000	1,491,530
1908	44,400,000	1,117,000	1914	62,500,000	1,483,500
1909	33,257,000	1,163,960	1915	67,004,000	1,663,521

California is the only state in America producing borax. Most of the deposits are in the desert portions of California, located largely in Inyo, Kern, Riverside, Imperial, and San Bernardino counties.

Magnesite, 1904–1915.

Year	Tons	Value	Year	Tons	Value
1904	2,850	$9,298	1910	16,570	$113,887
1905	3,933	16,221	1911	8,858	67,430
1906	4,032	40,320	1912	10,512	105,120
1907	6,405	57,720	1913	9,632	77,056
1908	10,582	80,822	1914	11,438	114,380
1909	7,942	62,588	1915	30,721	283,461

Magnesite is found in Tulare, Fresno, Riverside, Santa Clara and Sonoma counties.

Platinum, 1904–1915.

Year	Ounces	Value	Year	Ounces	Value
1904	------------	$1,849	1910	337	$8,386
1905	200	3,320	1911	511	14,873
1906	91.46	1,647	1912	603	19,731
1907	300.07	6,255	1913	368	17,738
1908	706	13,414	1914	463	14,816
1909	416	10,400	1915	667	21,149

The leading counties in the production of platinum are Butte and Sacramento.

Salt, 1904–1915.

Year	Tons	Value	Year	Tons	Value
1904	95,968	$187,300	1910	174,920	$395,417
1905	77,118	141,925	1911	173,332	324,255
1906	101,650	213,228	1912	185,721	383,370
1907	88,063	310,967	1913	204,407	462,681
1908	121,764	281,469	1914	223,806	583,553
1909	155,680	414,708	1915	169,028	368,737

Salt is produced by ten counties, Alameda being the largest producer, with 126,983 tons; San Mateo, 27,500 tons; Kern and Los Angeles about 20,000 tons each, and San Diego, 15,300 tons.

Lead, 1911–1915.

Year	Tons	Value
1911	701	$63,173
1912	685	61,653
1913	1,820	160,202
1914	2,349	183,198
1915	2,398	225,426

In 1915 the production was 4,796,299 pounds. The principal yield was from the following counties: Inyo, 4,323,639 pounds; Shasta, 180,936 pounds, and San Bernardino, 169,183 pounds.

Manganese.

In 1915 the production of manganese ore was 4,013 tons, valued at $49,098. The counties producing it were as follows: Mendocino, 2,858 tons; San Joaquin, 460 tons, and Alameda, 319 tons.

Gems, 1904–1915.

Year	Value	Year	Value
1904	$136,000	1910	$237,475
1905	148,500	1911	51,824
1906	497,090	1912	23,050
1907	232,642	1913	13,740
1908	208,950	1914	3,970
1909	193,700	1915	3,565

Gems are found in eight counties, San Diego County as a rule being the largest producer. In 1915 $300 in diamonds came from Butte County; Los Angeles, $700 in beach stones; San Mateo, $100 in beach stones, and the balance of $2,465 from San Diego in beryl, golden beryl, hyacinth, kunzite, tourmalines, and green topaz.

Asphalt (Refined), 1904–1915.

Year	Tons	Value	Year	Tons	Value
1904	56,187	$672,910	1910	184,967	$2,125,122
1905	40,304	285,290	1911	180,000	2,250,000
1906	77,756	777,560	1912	250,000	2,500,000
1907	79,718	1,058,400	1913	344,000	2,752,000
1908	105,443	1,082,376	1914	162,624	1,467,550
1909	136,664	1,707,159	1915	166,941	1,363,207

There are forty-eight refineries in the state, mostly located near the oil fields.

Bituminous Rock, 1904–1915.

Year	Tons	Value	Year	Tons	Value
1904	45,280	$175,680	1910	87,547	$165,711
1905	24,753	60,436	1911	75,125	117,279
1906	16,077	45,204	1912	44,073	87,467
1907	24,122	72,835	1913	37,541	78,479
1908	30,718	109,818	1914	66,119	166,618
1909	34,123	116,436	1915	17,789	61,468

The only counties which produced bituminous rock in 1915 were: Santa Cruz and San Luis Obispo. The manufacture of asphalt at the oil refineries has almost eliminated this industry.

Coal, 1904–1915.

Year	Tons	Value	Year	Tons	Value
1904	79,062	$376,494	1910	11,033	$23,484
1905	46,500	144,500	1911	11,047	18,297
1906	24,850	61,600	1912	14,848	39,092
1907	23,734	55,849	1913	25,198	85,809
1908	18,496	55,503	1914	11,859	28,806
1909	49,389	216,913	1915	10,299	26,662

The quality of the coal is not high, most of it being lignite. During 1915 there was a production reported in Amador, Contra Costa and Monterey counties, amounting to 10,299 tons, most of it being from Amador and Monterey.

Copper, 1904–1915.

Year	Pounds	Value	Year	Pounds	Value
1904	29,974,154	$3,969,995	1910	53,721,032	$6,680,641
1905	16,997,489	2,650,605	1911	36,838,024	4,604,753
1906	28,726,449	5,522,712	1912	34,169,997	5,638,049
1907	32,602,945	6,341,387	1913	34,471,118	5,343,023
1908	40,868,772	5,350,777	1914	30,491,535	4,055,375
1909	65,727,736	8,478,142	1915	40,968,966	7,169,567

Copper was produced in sixteen counties in 1915, Shasta being by far the largest, producing more than two-thirds of the amount, smaller amounts coming from Calaveras, Placer and Plumas counties.

Iron, 1910–1915.

Year	Tons	Value	Year	Tons	Value
1910	579	$900	1913	2,343	4,485
1911	558	558	1914	1,436	5,128
1912	2,508	2,508	1915	724	2,584

The ore produced in 1915 was utilized in the production of ferro-manganese and ferro-chrome by electric furnace reduction. There are considerable deposits of iron ore in Shasta, Madera and San Bernardino counties, but the production has never amounted to much on account of our having no economic supply of coking coal.

Value of California Mineral Production, by County, for 1915, Arranged in the Order of Their Importance.

County	Value	County	Value
1. Kern	$25,335,184	31. Mariposa	$412,326
2. Shasta	8,350,133	32. Humboldt	358,686
3. Fresno	8,152,300	33. Sonoma	276,104
4. Orange	6,617,112	34. San Joaquin	248,394
5. Los Angeles	4,168,612	35. San Luis Obispo	227,632
6. Amador	4,063,762	36. San Diego	211,129
7. Santa Barbara	3,984,966	37. Stanislaus	191,771
8. Nevada	3,492,946	38. Tulare	184,599
9. Inyo	2,771,042	39. San Mateo	177,891
10. Yuba	2,862,430	40. Marin	160,528
11. San Bernardino	2,674,042	41. Madera	145,063
12. Sacramento	2,562,281	42. San Francisco	128,270
13. Calaveras	2,161,893	43. Mono	109,425
14. Butte	1,622,245	44. Merced	94,032
15. Santa Cruz	1,581,531	45. Monterey	84,986
16. Solano	1,335,923	46. Imperial	77,433
17. Riverside	1,349,591	47. Lake	72,534
18. Contra Costa	1,309,505	48. Glenn	46,667
19. Tuolumne	1,171,438	49. Mendocino	24,536
20. Placer	963,860	50. Kings	18,608
21. Ventura	904,767	51. Colusa	16,003
22. Napa	884,221	52. Modoc	8,681
23. Alameda	861,683	53. Tehama	4,702
24. Plumas	745,715	54. Del Norte	4,524
25. Sierra	729,518	55. Yolo	2,040
26. San Benito	642,065	56. Lassen	870
27. Santa Clara	635,229	57. Alpine	----------
28. Siskiyou	514,094	58. Sutter	----------
29. Trinity	499,511		
30. El Dorado	428,336	Total	$96,663,369

TABLE XXXV.

Production of Metals, 1914-1915.

(From the California State Mining Bureau.)

Substance	1914		1915	
	Amount	Value	Amount	Value
Antimony ore			510 tons	$35,666
Asbestos	51 tons	$1,530	143 tons	2,860
Barytes	2,000 tons	3,000	410 tons	620
Bituminous rock	66,119 tons	166,618	17,789 tons	61,468
Borax	62,500 tons	1,483,500	67,004 tons	1,663,521
Brick	270,791 M	2,288,227	180,538 M	1,678,756
Cement	5,109,218 bbls.	6,558,148	4,918,275 bbls.	6,044,950
Chromite	1,517 tons	9,434	3,725 tons	38,044
Clay	179,948 tons	167,552	157,866 tons	133,724
Coal	11,859 tons	28,806	10,299 tons	26,662
Copper	30,491,535 lbs.	4,055,375	40,968,966 lbs.	7,169,567
Dolomite			4,192 tons	14,504
Feldspar	3,530 tons	16,565	1,800 tons	9,000
Fuller's earth	760 tons	5,928	692 tons	4,002
Gems		3,970		3,565
Gold		20,775,000		22,442,296
Graphite				
Gypsum	29,734 tons	78,375	20,200 tons	48,953
Infusorial earth	12,840 tons	80,350	12,400 tons	62,000
Iron ore	1,436 tons	5,128	724 tons	2,584
Lead	4,697,400 lbs.	183,198	4,796,299 lbs.	225,426
Lime	439,961 bbls.	378,663	356,534 bbls.	286,304
Limestone	572,272 tons	517,713	146,324 tons	156,288
Lithia			91 tons	1,365
Magnesite	11,438 tons	114,380	30,721 tons	283,461
Manganese	150 tons	1,500	4,013 tons	49,098
Marble	25,436 cu. ft.	48,832	22,186 cu. ft.	41,518
Mineral paint	132 tons	847	311 tons	1,756
Mineral water	2,443,572 gals.	476,169	2,274,267 gals.	467,738
Natural gas	16,529,963 M cu. ft.	1,049,470	21,992,892 M cu. ft.	1,706,480
Petroleum	102,881,907 bbls.	47,487,109	91,146,620 bbls.	43,503,837
Platinum	330 oz.	14,800	667 ounces	21,149
Potash	10 tons	460	1,076 tons	19,391
Pumice stone	50 tons	1,000	380 tons	6,400
Pyrites	79,267 tons	230,058	92,462 tons	293,148
Quartz rock	2,500 tons	4,800		
Quicksilver	11,373 flasks	557,846	14,199 flasks	1,157,449
Salt	223,806 tons	583,553	169,028 tons	368,737
Sand-glass	26,038 tons	17,888		
Sandstone	111,691 cu. ft.	45,322	63,350 cu. ft.	8,438
Silica (sand and glass)			28,904 tons	34,322
Silver		814,230		851,129
Slate			1,000 squares	5,000
Soapstone	1,000 tons	4,500	1,663 tons	14,750
Soda	6,522 tons	115,396	5,799 tons	83,485
Stone, miscellaneous*		4,860,357		5,011,108
Tungsten ore	4,830 tons	180,575	962 tons	1,005,467
Zinc	399,641 lbs.	20,381	13,043,411 lbs.	1,617,383
Totals		$93,436,553		$96,663,369

*Includes granite, macadam, rubble, paving blocks, sand and gravel, and grinding mill pebbles.

TABLE XXXVI.

Value of Minerals Produced by Counties, 1914–1915, also Number of Mineral Springs.

(From the California State Mining Bureau.)

	1914	1915	Number of mineral springs, 1908-1910
Alameda	$870,427	$861,683	6
Alpine	----------	----------	1
Amador	3,211,109	4,063,762	----------
Butte	1,755,782	1,622,245	3
Calaveras	2,005,954	2,161,893	1
Colusa	32,251	16,003	12
Contra Costa	1,149,321	1,309,505	8
Del Norte	5,938	4,524	----------
El Dorado	149,226	428,336	5
Fresno	7,484,473	8,152,300	9
Glenn	30,553	46,667	3
Humboldt	233,332	358,686	5
Imperial	250,529	77,433	8
Inyo	2,085,112	2,771,042	36
Kern	28,040,296	25,335,184	26
Kings	740	18,608	----------
Lake	63,503	72,534	56
Lassen	4,568	870	19
Los Angeles	4,665,504	4,168,612	14
Madera	203,009	145,063	10
Marin	554,137	160,528	4
Mariposa	187,505	412,326	4
Mendocino	560	24,536	35
Merced	[1]111,701	94,032	----------
Modoc	1,252	8,681	18
Mono	16,060	109,425	20
Monterey	114,254	84,986	8
Napa	971,748	884,221	14
Nevada	3,330,940	3,492,946	1
Orange	8,831,763	6,617,112	2
Placer	1,097,098	963,860	12
Plumas	161,308	745,715	16
Riverside	1,580,805	1,349,591	23
Sacramento	2,629,244	2,562,281	----------
San Benito	436,259	642,065	1
San Bernardino	1,616,537	2,674,042	44
San Diego	315,267	211,129	19
San Francisco	119,889	128,270	----------
San Joaquin	129,930	248,394	----------
San Luis Obispo	63,465	227,632	12
San Mateo	246,478	177,891	----------
Santa Barbara	2,686,309	3,984,966	7
Santa Clara	266,956	635,229	12
Santa Cruz	1,642,958	1,581,531	3
Shasta	5,047,838	8,350,133	16
Sierra	725,129	729,518	2
Siskiyou	385,825	514,094	28
Solano	1,683,866	1,335,923	2
Sonoma	326,144	276,104	21
Stanislaus	[2]5,882	191,771	2
Sutter	----------	----------	----------
Tehama	300	4,702	11
Trinity	747,282	499,511	4
Tulare	161,252	184,599	18
Tuolumne	1,050,928	1,171,438	1
Ventura	1,000,729	904,767	9
Yolo	736	2,040	----------
Yuba	2,823,282	2,862,430	----------
Asbestos, unapportioned	1,530	----------	----------
Totals	$93,314,773	$96,663,369	591

[1] Includes output of a gold dredge in Stanislaus County. [2] See Merced.

CALIFORNIA MINERAL SPRINGS.*

There are a very large number of valuable mineral springs in California, which contain the same curative properties as the most famous spas of Europe, but they are not so widely known as they deserve. Among these are to be found alkaline, carbonated, chalybeate, epsom salts, saline, sulphur, soda, vichy, cold, warm, and hot, and also hot mud springs. There are 591 springs in California, some of which consist of several separate springs, and of these 119 are spring resorts.†

Mineral waters are generally divided into four classes: Acidulous, sulphurous, chalybeate and saline.

In the production of mineral waters California ranked first in 1914. The state also ranked fourth in number of commercial springs and third in value of output. These figures refer to mineral water actually bottled and sold, and are produced in twenty-two counties situated in all parts of the state.

Half of California mineral water is reported to be sold for table use. There are resorts at twenty-three of the larger springs with accommodation for nearly 4,800 patrons, and the water at seventeen springs is used for bathing. Spring owners reported a total of 46,000 gallons of water used for the manufacture of soft drinks.

Production and Value of Mineral Waters in California, 1908–1914.

Year	Commercial springs	Quantity sold, gallons	Value	Price per gallon received at springs, cents
1908	40	1,960,770	$393,920	20.1
1909	44	2,179,187	444,230	20.4
1910	41	2,008,697	394,841	19.7
1911	40	2,310,237	578,439	25.0
1912	41	2,089,951	532,971	26.0
1913	49	2,801,393	531,925	19.0
1914	48	2,443,572	476,169	22.0

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*For a list of mineral springs in the state, see Report of State Board of Agriculture, 1914, pages 176–178.

†Eleven counties—Amador, Del Norte, Kings, Merced, Sacramento, San Francisco, San Joaquin, San Mateo, Sutter, Yolo, and Yuba—have no springs. The largest number is 56, in Lake County, followed by San Bernardino with 44, Inyo 36, and Mendocino 35.

PART IX.

NATIONAL FORESTS IN CALIFORNIA AND THE LUMBER INDUSTRY.

Grazing Permits; National Forests; Forest Fires; Land Classification Projects; Predatory Animals Destroyed; Timber Sold and Cut; Free Use of Timber; Ownership of Forests by Counties; Lumber Cut by Mills; Hard Woods and Soft Woods.

LUMBER.

The total area within the boundaries of the twenty national forests wholly or partly in California June 30, 1916, was 24,866,776 acres, of which 19,507,474 acres were public lands. This is larger than the area of national forests in any other state in the Union, Idaho and Montana ranking next, with 17,719,972 and 16,104,734 acres, respectively. The area in California by forests, with the name of the forest headquarters, is shown by the following table taken from the reports of the forest service, U. S. Department of Agriculture.

Area and Location of National Forests.

Forest	Area of national forest land	Area of other lands within national forest boundaries	Total area within national forest boundaries	Date of latest proclamation	Forest headquarters (postoffice)
Angelus	885,216	274,447	1,159,663	May 27, '13	Los Angeles.
California	822,364	240,258	1,062,622	Oct. 12, '10	Willows.
Cleveland	591,750	221,866	813,616	Apr. 24, '16	Escondido.
Crater*	46,980	10,042	57,022	July 19, '15	Medford, Ore.
El Dorado*	549.950	285,850	835,800	July 28, '10	Placerville.
Inyo*	1,268.604	69,176	1,337,780	Feb. 23, '11	Bishop.
Klamath*	1,470,848	263,817	1,734,665	June 21, '12	Yreka.
Lassen	992,804	379,646	1,372,450	Dec. 30, '10	Red Bluff.
Modoc	1,182,298	400,561	1,582,859	Dec. 23, '10	Alturas.
Mono*	801,485	81,665	883,150	June 30, '11	Gardnerville, Nev.
Monterey	401,492	83,733	485,225	Dec. 12, '10	King City.
Plumas	1,146,645	286,215	1,432,860	Nov. 17, '14	Quincy.
Santa Barbara	1,695,175	233,119	1,928,294	June 9, '15	Santa Barbara.
Sequoia	2,196,199	273,071	2,469,270	July 1, '15	Bakersfield.
Shasta	828,367	758,513	1,586,880	June 19, '12	Sisson.
Sierra	1,493,474	172,006	1,665,480	Apr. 27, '15	Northfork.
Siskiyou*	349,650	52,145	401,795	May 4, '14	Grants Pass, Ore.
Stanislaus	809,679	294,733	1,104,412	Apr. 13, '15	Sonora.
Tahoe*	546,326	660,460	1,206.786	July 28, '10	Nevada City.
Trinity	1,428,168	317,979	1,746,147	June 7, '12	Weaverville.
Totals	19,507,474	5,359,302	24,866,776		

*Forest in two states. Area given is for California only.

The total area within the boundaries of the national forests was decreased in 1911 by presidential proclamation, which eliminated 4,598,705 acres and added 2,806,267 acres. While it will doubtless be necessary in the future to make small additions and eliminations from time to time, as conditions change, it is believed that the boundaries now established or planted may be regarded as fairly stable.

National forests in California	1916	Acres
Gross area, June 30, 1916	24,866,776	24,940,249
Alienated area	5,359,302	5,407,518
Net area June 30, 1916		19,507,474

About $883,000 is spent annually in administering and protecting the national forests in California. During the fiscal year ending June 30, 1916, permanent improvements, including 236 miles of trails and 360 miles of telephone lines, were built at a cost of $93,398. The government forest systems now aggregate 3,503 miles of trails and 4,427 miles of telephone lines.

Each national forest is under the immediate control of a forest supervisor. For purposes of administration and protection, the forests are divided into ranger districts, each in charge of a district ranger. Under the district rangers are the protection forces, lookouts, patrolmen and forest firemen. The lookouts, stationed upon high peaks, report fires to the district ranger by telephone or heliograph.

Rangers, patrolmen and firemen employed by the Forest Service in California during the summer of 1916 totaled 434, with fire detection service performed by 95 lookout men. In addition, about 500 men—mountaineers, miners and lumbermen—were registered with the Forest Service as volunteers to be called out in emergencies. Eighty-eight patrolmen, paid by private owners of timber within the forest, worked under the supervision of and in cooperation with the Forest Service. During the fiscal year of 1916, about $40,000 was contributed by railroads, lumber companies, municipal organizations, counties, and private citizens for fire protection, and spent through cooperative agreements with the Forest Service on 4,000,000 acres of timber land and valuable watersheds.

Although in 1916, a season of great fire hazard, a total of 1,387 fires were reported and extinguished, the damage done within the national forests of the state was but $20,944, a sum far less than the average for previous years.

Forest Fires in California, 1906–1916.

Year	Number of fires	Area burned, acres	Drainage, value
1906	120	650,000	
1907	305	75,060	$8,601
1908	572	163,216	103,259
1909	638	357,269	600,000
1910	553	367,344	407,569
1911	797	66,508	51,083
1912	998	156,241	31,906
1913	1,971	559,370	511,077
1914	1,565	122,636	263,160
1915	1,525		7,374
1916	1,387	84,731	20,944

Since the chief purposes in establishing the national forests were watershed protection and the conservation of a public timber supply, they were necessarily established in mountainous regions. Lands valuable for agriculture, mining and other uses foreign to the above purposes were included only incidentally and unavoidably and occur in scattered and more or less isolated areas. The mineral lands are subject to location, entry and patent under the mining laws applicable to the public domain, and the agricultural lands are subject to acquisition under the Forest Homestead Law. Congress has authorized and directed the Secretary of Agriculture to select, classify and segregate all lands within the national forests that may be opened to settlement and entry under the Forest Homestead Law.

The result of land classification to January 1, 1917, is shown by the following table:

Land Classification Projects in California January 1, 1917.

Forest	Project	Total acre classified, acres	Agricultural under present conditions, acres	Agricultural after removal of timber, acres
Angeles	Cajon	143,333	382	
	Tugunga	164,836	997	
	1915	857,131	9,586	
Cleveland	Laguna	23,115		
	Oak Grove	56,920	11,265	
	1915	806,044	2,926	
Lassen	Hat Creek	91,675	1,410	6,745
Santa Barbara	Santa Clara	394,229	6,946	
	Ventura	725,739	8,566	
Sequoia	Sequoia	2,113,180	81,429	
Shasta	Cayton	23,080		
	Henderson	13,785		530
	Dulaney	12,390		2,950
	McCloud Flats	35,760	740	7,550
	Red Rock	24,430	1,100	640
	Sisson	16,000	1,160	
	Trinity Center	38,400	263	
Sierra	Sierra	1,665,480	2,502	340
California	California	802,522	62	
El Dorado	El Dorado	548,611	214	640
Modoc	Warner Mountain	359,784		
Stanislaus	Stanislaus	809,679		
Tahoe	Tahoe	557,079	3,708	5,904
Totals		10,283,202	124,256	25,299

While this table shows the relative proportion of agricultural land to be very small, the total area made available for agricultural use is considerable. Classification is now under way on several million acres and it will be carried on until the entire national forest areas are covered. The classification records are open to the public and the agricultural land is taken up by homesteaders about as fast as it is classified.

The national forest administrative act contains authority for allowing the use of national forest lands and resources as fully as may be consistent with the accomplishment of the main purposes of watershed protection and timber conservation. Probably the most important of such uses in California is the development of hydroelectric power. In 1916 four permits were issued for a total of 8,727 horsepower at minimum stream discharge. In all fifty-six permits are in force for a total of 435,000 horsepower at minimum stream discharge. The total capacity of machinery now installed in plants operating under permits is 272,120 horsepower.

Permits for other uses to a total of 3,915 are in force. Among the more important of these are summer residences, hotels, resorts, stores, apiaries, pastures, drift fences, telephone lines, water conduits and reservoirs.

The privilege of grazing stock upon the national forests is allowed where it does not interfere with the purposes for which they were established.

Of the 19,532,731 acres, approximately 12,350,000 only are used or partially used for grazing purposes, the balance of the areas being unused on account of no forage value, inaccessibility, poisonous plants, lack of water or areas closed to grazing for the protection of municipal water supply, to prevent damage to forest growth, or for other public uses, and areas available but not applied for. A large proportion of the present unused areas will be made usable in cooperation with the stockmen by the development and improvement of watering facilities, the construction of trails and drift fences and the revegetation of depleted areas.

The following table shows the number of grazing permits granted during the years 1911 to 1916 and the number and kind of stock grazed upon the national forests in California:

Grazing Permits, 1911–1916.

Year	Number of permits	Cattle, number	Horses, number	Hogs, number	Number of permits	Sheep and lambs	Number of goats
1911	2,422	151,582	9,824	3,867	298	372,646	13,464
1912	2,521	169,361	10,403	3,480	367	432,974	15,235
1913	2,664	169.951	11,765	2.360	377	438,556	13,249
1914	2,696	175,356	12,487	1,608	348	424,917	10,956
1915	2,694	176,616	10,383	1,644	317	392,271	6,644
1916	2,765	183,746	9,922	1,224	326	409,835	7,217

This table shows an increase between 1911 and 1916 in the number of permits issued and in the number of stock, notwithstanding the fact that approximately 3.000.000 acres of principally grazing lands were eliminated from the forests during those five years.

To reduce loss of live stock on the national forest ranges, the Forest Service in cooperation with the United States Biological Survey and the stockmen, has taken an active part in the destruction of predatory animals. The following table shows the number of such animals killed by forest officers in the years 1910 to 1916, inclusive:

Predatory Animals Destroyed, 1910–1916.

Animal	1910	1911	1912	1913	1914	1915	1916	Total
Bears	73	37	12	6	28	38	27	221
Mountain lions	23	5	3	3	--------	7	8	49
Wolves	2	7	2	--------	6	16	1	34
Coyotes	903	743	478	337	419	337	1,551	4,768
Wildcats	309	193	160	132	91	101	342	1,328
Lynxes	37	15	2	2	--------	10	3	69
Totals	1,347	1,000	657	480	544	509	1,932	6,469

In the national forests of California there are about 109,000,000,000 feet of timber, principally pine, fir and cedar, having an estimated value of $200,000,000. Much of this timber is at present inaccessible but will come on the market with the increase of California's population and the more intensive development of her resources.

The amount and value of timber sold, and cut under sales in national forests in California in the fiscal years 1911 to 1916 is shown by the following table:

Timber Sold and Cut Under Commercial Sales in National Forests, 1911–1916.

Year	Timber sold, board feet	Value	Timber cut under sales, board feet	Value
1911	112.438,000	$295,536 22	37,899,000	$80,243 65
1912	109,214,000	232,697 81	43,914,000	97,239 33
1913	1,064,804,000	2,324,936 03	52,419,000	108,708 74
1914	79,706 000	153,171 54	48,598,000	105,467 99
1915	32,251,000	61,647 59	35,841,000	78,400 33
1916	151,964,000	306,540 25	55,251,000	119,921 05

In addition to the timber cut under sale a certain quantity is sold and cut at cost rates. In 1916 the number of sales was 439; 2,429,000 board feet were sold for $1,428.07 of which 2,101,000 board feet were cut and the amount paid was $1,282.96. A certain quantity of free use timber is also allowed; for this, in 1916, 2,797 permits were issued under which 7,711,000 board feet were cut, the value of which was $14,108.63.

In the timber-sale policy of the Forest Service, provision is first made for local needs, present and future, and sale of timber which will enter into the general markets is considered only when it is clear that an excess over the permanent supply required by local industries exists. The number of timber sales, classified according to size of sale, is shown by the following table:

Number of Timber Sales, 1911–1916.

Amount	Number					
	1911	1912	1913	1914	1915	1916
Under $100	506	575	555	682	861	997
From $100 to $500	24	37	24	16	9	6
From $500 to $1,000	2	9	5	11	8	3
From $1,000 to $5,000	6	12	14	10	3	6
Over $5,000	5	2	9	4	2	5
Total number of sales	543	635	607	723	883	1,017

Residents and miners may obtain $20 worth of timber from national forests for their own use free of charge. The material given away is restricted largely to trees that should be removed for the benefit of the forest. Free use is also granted liberally for cooperative and public enterprises. Additional timber may be purchased in any amount by farmers and settlers for use on farms and homesteads at actual cost of sale administration. The amount and value of timber cut under free use during the years 1911 to 1916 are shown by the following table:

Free Use of Timber, 1911–1916.

Year	Number of permits	Board feet	Value
1911	3,085	9,197,000	$17,359 02
1912	2,756	8,490,000	14,797 95
1913	3,118	8,918,000	18,011 15
1914	2,915	8,416,000	15,250 47
1915	3,106	6,778,000	16,996 78
1916	2,797	7,711,000	18,788 44

The receipts from the national forests in California are principally from timber sales and rental charges on account of water power and use of range for grazing and other uses of national forest lands and resources. Twenty-five per cent of these receipts is paid annually by the United States to the state to be expended for roads and schools in the counties containing national forest lands. In addition to this, 10 per cent of the toal receipts is expended by the forest service for the construction of roads and trails where most needed by communities within or adjacent to the national forests. The amounts paid to the state of California for the fiscal years 1910 to 1915 are shown by the following table:

Amounts Paid to the State from Forest Receipts for School and Road Moneys.

(25 per cent of the receipts.)

Year	Amount
1910	$60,752 91
1911	53,716 87
1912	62,052 82
1913	74,541 55
1914	
1915	67,611 87
Total	$393,216 02

Reforestation, 1911–1917.

Year	Sown acres	Planted acres	Total
1911	2,659	169	2,828
1912	632.69	188.60	821.29
1913	133.16	276.77	409.93
1914	5.15	224.09	229.24
1915	22.49	40.80	63.29
1916		240.00	240.00

In the national forest nursery at Pilgrim Creek, Shasta County, 330,000 seedlings were raised and 239,000 transplanted, or a total of 569,000.

Of the standing timber in this state a very large percentage is now in private ownership, the total acreage amounting to 4,555,941.

Ownership of Forests.

County	Acres	County	Acres
Alpine	3,270	Plumas	224,717
Amador	17,903	Riverside	4,784
Butte	89,737	San Benito	2,960
Calaveras	68,663	San Bernardino	10,940
Del Norte	109,600	San Diego	23,460
El Dorado	96,820	San Luis Obispo	2,040
Fresno	19,983	Santa Barbara	160
Glenn	16,796	Santa Cruz	19,956
Humboldt	486,950	Shasta	429,512
Kern	8,600	Sierra	134,176
Lake	10,320	Siskiyou	693,180
Lassen	244,434	Sonoma	162,474
Madera	23,176	Tehama	126,358
Marin	11,597	Trinity	333,840
Mariposa	35,073	Tulare	33,358
Mendocino	475,318	Tuolumne	131,378
Modoc	265,317	Ventura	803
Mono	15,320	Yuba	19,400
Monterey	81,518		
Nevada	60,101		
Placer	156,949	Total	4,555,941

THE LUMBER INDUSTRY.

The wooded land of the state is estimated to have an area of 44,700 square miles, or 22 per cent of the total area of the state. Most of the timber in this area is found upon the Sierra Nevada range and upon the Coast ranges north of San Francisco Bay. A little is found in the Coast ranges farther south, and in those of southern California. The principal species are redwood and yellow pine, with smaller amounts of sugar pine, Douglas fir, and incense cedar.

Redwood is the only important kind of lumber, the production of which is limited to one state. California has no competitor in its production, nor can it ever have, since there is no commercial supply of redwood timber elsewhere. This species is found in a narrow strip stretching from the Oregon line southward, closely bordering the coast, nearly to Monterey Bay. In this strip, comprising some 2,000 square miles, there is estimated to be 80,000,000,000 feet of redwood in a pure forest. This is probably the most dense forest, as measured by the amount of timber per acre, in the world. Lumbering is carried on mainly about Humboldt Bay, at Crescent City, near the Oregon line, and at various points in Mendocino County.

Yellow pine is found along the entire length of the Sierra Nevada and in the Coast ranges. It occupies in the Sierra a well-defined belt which, in the southern part of the range, is limited by a contour 3,000 feet above sea level, while northward it gradually descends, coming down to about 1,500 feet in the upper Sacramento Valley. Its upper limit is on an average about 6,500 feet, above which it is succeeded by species which are fitted to a colder climate. Throughout its range at higher elevations, it occurs with sugar pine in the average proportion of about three of the former to one of the latter. The forest also contains varying amounts of incense cedar and of Douglas fir. The composition of the forests in the northern part of the Coast ranges is quite similar to that in the Sierra, excepting that the proportion of Douglas fir is somewhat greater.

Scattered about in the yellow pine forests, on the slope of the Sierra Nevada, at altitudes ranging from 4,000 to 6,000 feet, are ten groves, differing greatly in size, of *Sequoia gigantea,* the big tree. These trees range in height up to 325 feet, and in diameter to a little over 30 feet. The Big Trees do not occur in pure stands but are intermingled with yellow and sugar pine, firs and cedar.

The total merchantable stand of saw timber in California, exclusive of the redwood belt, has been estimated at 263,600,000,000 feet, board measure, of which 131,200,000,000 feet is privately owned and 132,400,000,000 feet is the property of the government. Of the latter amount, 115,800,000,000 feet is in the national forests and the rest in national parks and Indian reservations or upon the public domain. The private and national forest timber taken together, a total of 247,000,000,000 feet, board measure, is composed of the principal forest species in about the following proportion: Sugar pine, 15 per cent; western yellow pine, 38 per cent; Douglas fir, 19 per cent; white fir, 14 per cent; incense cedar, 3 per cent; California red fir, 4 per cent; lodgepole pine, 2 per cent; big tree, 2 per cent; other species, 3 per cent.

Lumbering is one of California's most important industries. Its principal products are lumber, laths, shingles and shakes. The amount of lumber manufactured annually in the eleven years 1905 to 1916 is shown in the following table:

Lumber Cut or Manufactured, 1905–1916.

Year	M. feet, board measure	Year	M. feet, board measure
1905	1,077,499	1911	1,207,561
1906	1,348,599	1912	1,203,059
1907	1,345,943	1913	1,183,383
1908	996,115	1914	1,154,368
1909	1,143,507	1915	1,119,628
1910	1,254,826	1916	1,413,541

The laths, shingles and shakes manufactured during 1915 and 1916 are estimated as follows:

	Year 1915	Year 1916
Laths	38,284,000	30,713,000
Shingles	200,755,000	348,622,000
Shakes	6,628,000	1,963,000

Lumber Cut by Species by 136 Mills in 1915.

Kind of wood	35 mills sawing 10,000M and over	8 mills sawing 5,000M to 10,000M	15 mills sawing 1,000M to 5,000M	15 mills sawing 500M to 1,000M	58 mills sawing 50M to 500M	Total
Douglas fir	100,078	11,845	1,900	1,511	2,346	117,680
Western pine	329,123	28,824	20,016	5,290	6,384	389,637
Redwood	399,553	7,644	8,972	1,215	1,440	418,824
Spruce	9,477					9,477
Cedar	9,213	2,554	84	151	183	12,185
Hemlock	4,537					4,537
Sugar pine	107,641	4,677	772	860	544	114,494
White fir	46,067	2,877	742	516	518	50,720
Oak*	6			790	6	802
Birch*				120		120
Jenisero*				5		5
Spanish cedar*				52		52
Eucalyptus					200	200
Totals	1,005,665	58,421	32,486	10,510	11,621	1,119,628

*Imported in the log.

CUT OF LUMBER BY SPECIES BY 182 MILLS IN 1916.

District Forester DuBois estimates that the lumber cut in California in 1916 was probably the largest in the history of the state. To date 182 mills have reported a cut of 1,415,541,000 feet board measure. The estimated cut is 1,420,000,000 feet as against an estimated cut for 1915 of 1,130,000,000 feet. The output of fifty-two of the largest mills was 1,328,136,000 feet. The cut of more important species was reported as follows:

Western pine	494,973,000 feet board measure
Redwood	490,828,000 feet board measure
Sugar pine	165,461,000 feet board measure
Douglas fir	141,200,000 feet board measure
White fir	85,918,000 feet board measure
Cedar	16,587,000 feet board measure

The manufacturers of redwood in 1916 received an average of about three dollars more for their lumber than they did a year ago, while manufacturers of sugar and white pine received for uppers about six dollars more per thousand.

Sawmills.

Active sawmills (cutting 50 M and over) reporting, and reported production of each kind of lumber, lath and shingles.

Softwoods, in M ft., b. m.

Number of active sawmills[1]	136
Aggregate M feet board measure[1]	1,119,458
Douglas fir	117,951
Hemlock	4,537
Western yellow pine[2]	389,991
Spruce	9,477
Redwood	418,824
Cedar	12,185
White fir[1]	50,820
Sugar pine	114,494
Total soft woods[1]	1,118,279
Oak	802
Birch	120
Minor species	257
Total hard woods	1,179
Lath, thousand	38,284
Shingles, thousand	200,755

The lumber cut of 1915 was influenced by a large surplus carried over from 1914 and by the restricted markets brought about by the European war.

During the ten years, 1899 to 1909, the output of rough lumber in California increased 55.1 per cent and that of laths 183.4 per cent, while the production of shingles decreased 11.7 per cent. The period of most rapid growth in the industry was from 1899 to 1904, when the output of lumber increased 46.2 per cent. The woods which supply the raw material are almost exclusively conifers, the hardwood cut in 1909, practically all of which was California or tanbark oak, forming only one-fifth of 1 per cent of the total lumber production during the year. A total of 521,630 thousand feet, board measure, or more than 45.6 per cent of the lumber output in 1909, was California redwood, a species of timber which does not occur in saw-log size outside of California. Chief among the other species sawed into lumber in 1909 were western pine, with a production of 364,748 thousand feet, board measure; Douglas fir, with a production of 88,852 thousand feet; sugar pine, with a production of 88,822 thousand feet. The manufacture of shingles, while carried on to some extent in connection with that of lumber, nevertheless amounts practically to a separate industry. Over 88 per cent of the shingle output of the state for 1909 was manufactured from redwood, which timber possesses in very high degree the qualities most desirable in shingle material.

The term ''white fir'' is used as a designation for two or three firs of the Rocky Mountains and the Pacific Coast. The lumber produced from them in no way resembles that of the Douglas fir, which, botanically, is not a fir at all.

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[1] Includes 2 mills in Nevada. [2] Includes 1 mill in Nevada.

In the production of redwood, yellow pine, sugar pine, and white fir, California holds the first place.

Sugar Pine. The commercial range of this great giant of the white pine family is confined almost entirely to the regions of the Sierra in California, where 91.4 per cent of the total cut of 97,191,000 feet was produced in 1909. The output was 81.5 per cent greater than in 1899. The average value of the product per thousand feet in 1909 was 36 cents greater than in 1908, but $1.70 less than in 1907.

The lumber industry includes three distinct operations, which are in some cases carried on by the same organization, in others separately:

1. The logging industry, including the felling of timber, cutting it into lengths, and transporting it by rail or river or flume to the mill.

2. The sawmill industry, in which the raw material consists of saw-logs, the products of the lumber camps; the finished product of rough lumber, including beams, joists, scantling, boards, shingles, laths, etc.

3. The planing mill industry, in which the raw material consists of rough lumber and the finished product planed lumber, with such minor manufactures as are carried on in connection with these mills. In the United States this industry ranks fourth among the greatest manufacturing industries of the country, being exceeded in value of products only by iron and steel, the textile, and the slaughtering and meat-packing industries.

The ten largest holdings of timber lands comprise 2,448,094 acres, or approximately 42 per cent of all the privately-owned timber and cut-over land in the state. They are as follows:

Owners	Acres
Central Pacific Railroad Company (S. P.)	921,311
T. B. Walker and associates	673,665
McCloud River Lumber Company	232,063
Diamond Match Company	159,499
Hammond Lumber Company	94,760
Union Lumber Company	80,350
L. E. White Lumber Company	79,540
Weed Lumber Company	71,458
C. A. Smith	69,768
Sierra Nevada Wood and Lumber Company	65,680

The Southern Pacific holding is the greatest in the United States—106,000,000,000 feet. It is difficult to give an adequate idea of its immensity. It stretches practically 680 miles along that railroad, between Portland and Sacramento. The fastest train over this distance takes thirty-one hours. During all that time the traveler is passing through lands a large portion of which, for 30 miles on each side, belongs to the railroad, and in almost the entire strip this corporation is the dominating owner of both timber and land.

The holdings under 2,000 acres are too numerous to publish, but they are summarized as follows:

Size of holdings	Number of holdings	Amount in acres		Total
		Timber	Cut-over	
Below 1,000 acres	1,087	460,093	79,071	539,164
1,000 to 2,000 acres	196	195,687	59,321	255,008
2,000 acres and over	286	4,081,794	947,494	5,029,288
Totals		4,737,554	1,085,886	5,823,440

PART X.

MANUFACTURES IN CALIFORNIA.

Lumber and Timber Products; Slaughtering and Meat-Packing; Canning and Preserving; Foundry and Machine Shops; Flour-mills; Printing and Publishing; Petroleum Refining; Dairy Products; Leather, Tanned and Curried; Malt Liquors; Wines; Gas, Illuminating and Heating; Cement; the Automobile Industry; Engines and Power; Summary of Manufactures; Manufacturers in Certain Cities. 1909-1914.

MANUFACTURES, 1900-1914.*

Although agriculture and mining are the principal industries in California, the state shows a marked growth in manufactures during the last forty years. The gross value of products per capita of the total population increased from $119 in 1869 to $223 in 1909.

The natural resources of the state give rise to several of its leading industries, such as the lumber industry, canning and preserving, flour milling and gristmilling, petroleum refining, the refining of beet sugar, the wine industry, and the manufacture of cement.

The high cost of fuel, the greater part of which had to be brought from outside of the state, retarded the early development of manufactures, but the development of the oil fields, and the utilization during recent years of electricity generated by water power have given a decided impetus to manufactures in California.

The statistics of manufactures do not include the United States Navy Yard at Mare Island, which in 1909 employed an average of 1,917 wage earners, and the value of the work performed was $4,335,000.

The most important manufacturing industries are as follows:

Lumber and Timber Products. This industry embraces logging operations, sawmills, planing mills, and establishments engaged in the manufacture of wooden packing boxes. It does not include mills engaged exclusively in custom sawing. The industry is the leading one in the state, giving employment in 1909 to 22,935 wage earners, or 19.9 per cent of the total for all manufacturing industries, and the value of its products amounted to $45,000,000, or 8.5 per cent of the total.

The lumber industry is one of the seasonal industries. The number of wage earners in January, the month of minimum employment, was 14,585 less than the number in July, the month of maximum employment.

Slaughtering and Meat-Packing. This classification includes the wholesale slaughtering and meat-packing establishments and those engaged in the manufacture of sausage only. The animals slaughtered are largely cattle and sheep from the foothills and lower mountain slopes and from the plateau region of the northeastern part of the state and southeastern Oregon, conditions in these sections being very favorable to stock raising. About half of the stock slaughtered is raised within the state. The fact that within recent years the meat packers have been able to overcome, through refrigeration, climatic difficulties, which required the excessive use of preservatives in salt meats, has been an important factor in the growth of this industry. The total value of products reported for the industry in 1909, $34,280,000, represents an increase of $18,463,000, or 116.7 per cent, as compared with the amount reported for 1899.

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*The statistics of manufactures for the year 1914 are now in course of publication by the Census Bureau. A brief summary of those issued to date are given, relating to manufactures in towns.

Canning and Preserving. This classification includes the canning of fruits and vegetables, fish, oysters, clams, etc., the preparation of pickled, smoked, and dried fish, the packing of dried fruits by packing houses which make a specialty of such business, and the manufacture of pickles, preserves, jellies, sauces, etc., but it does not include the drying and packing of fruits by the grower on the farm, nor does it include the canning of meats, soups, and similar products in meat-packing establishments (the statistics for which are included with those for the slaughtering and meat-packing industry). The canning, pickling, smoking and drying of fish and the canning of oysters, form comparatively unimportant branches of the industry. California far exceeds any other state in the value of products for this industry, the amount reported for 1909 being $32,915,000 or 21 per cent of the total for the United States. Canning and preserving is a seasonal industry, giving employment to a large number of persons in July, August, September, and October, and to a comparatively small number during most of the other months of the year. The number of wage earners employed in the industry varied from 2,781 in February to 16,047 in August.

Foundry and Machine Shop Products. This industry embraces, in addition to the general class of foundries and machine shops, establishments engaged in such special lines as the manufacture of gas machines and gas and water meters, hardware, plumbers' supplies, steam fittings and heating apparatus, and structural ironware. It does not, however, include establishments which manufacture distinctive products covered by other classifications, such as cash registers and calculating machines, or electrical machinery, apparatus, and supplies. This industry ranked third among the manufacturing industries of the state in 1909 in number of wage earners, giving employment to 8,377, or 7.3 per cent of the total for all industries.

Flourmill and Gristmill Products. The statistics for all merchant mills grinding wheat, rye, buckwheat, corn or other grains are included in this classification. It does not, however, include factories making fancy cereals or other food preparations as a chief product, or mills doing custom grinding exclusively. The industry shows an increase of $12,143,000, or 93.1 per cent, in value of products during the decade 1899–1909.

Printing and Publishing. This classification includes job printing, the printing and publishing of books, newspapers and periodicals, and music, bookbinding, steel engraving, and lithographing. The 1,240 establishments reporting, included 705 publishing newspapers and periodicals and 481 doing book and job work exclusively. The average number of wage earners employed in the newspaper and periodical branch of the industry was 3,650, and the value of products $15,239,000; the average number of wage earners engaged in book and job work was 2,907, and the value of products, $7,438,000. These two branches of the industry together employed 86.8 per cent of the average number of wage earners, and reported 90.6 per cent of the total value of products for the entire industry in 1909.

Cars and General Shop Construction and Repairs by Steam Railroad Companies. This industry represents the work done in the car shops, but does not cover minor repairs in roundhouses. It is seventh in importance as measured by value of products, and shows a remarkable development for the ten-year period. In 1909 the industry gave employment to an average of 9,342 wage earners, the second largest number reported for any manufacturing industry in the state, and the value of the work amounted to $18,719,000.

Petroleum Refining. The refining of petroleum has made remarkable progress in the state during the last few years, the value of the products of the industry in 1909 being $17,878,000, or over twenty-five times as great as in 1899, when it was only $698,000.

Butter, Cheese and Condensed Milk. This industry, which in California is confined chiefly to the manufacture of butter, has made marked progress during the past decade, the value of products increasing from $3,583,000 in 1899 to $12,761,000 in 1909, a gain of 256.2 per cent. The manufacture of cheese and condensed milk decreased materially during the period 1904–1909.

Leather, Tanned, Curried and Finished. The tanning, currying and finishing of leather did not become prominent in California until about 1861. From that time, however, it grew rapidly, and since 1877 the local supply of hides and skins has not been large enough to satisfy the requirements of the industry, so that it has been necessary to supplement it by hides and skins brought in from other states or imported from foreign countries.

Malt Liquors. This industry shows considerable growth for the decade, being greater, however, for the five-year period, 1899–1904, than for the following five-year period.

Wines. The extensive vineyards of California have placed the state far ahead of any other in the wine industry. In 1909 the value of the products for the industry in the state, $8,937,000, represented 68.1 per cent of the total for the United States.

Gas, Illuminating and Heating. The manufacture of gas is notable in California, because of the extensive use of petroleum. On account of the lack of coal in the state, the product of the gas plant has been limited to the manufacture of carbureted water gas and oil gas. According to the statistics for 1909, the production of oil gas greatly exceeds that of carbureted water gas. The total value of products reported for the industry in 1909 was $8,927,000, an increase of $5,765,000, or 182.3 per cent over that for 1899.

Cement. California has numerous beds of soft limestone and clay which are relatively low in magnesia and which are being utilized to a considerable extent for the manufacture of Portland cement. In 1904 there were four establishments engaged in the industry, employing 596 wage earners and reporting products valued at $1,601,000, while in 1909 the industry had increased to eight establishments, giving employment to an average of 2,407 wage earners and reporting a product valued at $6,504,000. The counties in which the industry is most extensively carried on, named in order of importance, are Solano, Santa Cruz, and San Bernardino.

The Automobile Industry. This industry, which in California had its beginning but a short time prior to 1904, shows a very high rate of increase, the value of products in 1909 being more than forty times as great as in 1904.

Engines and Power. The following shows the number of engines or other motors, according to their character, employed in generating power (including electric motors operated by purchased current) and their total horsepower in 1899 and 1909. The more general use of gas engines is shown, there being 765 such engines, with an indicated capacity of 10,115 horsepower, in 1909, as against 545 engines with 3,244 horsepower in 1899.

Water wheels show a decrease in number but an increase in total horsepower. The figures also show that the practice of renting electric power is increasing rapidly, 35.4 per cent of the total power being rented electric power in 1909, as against 7.6 per cent in 1899. The proportion for 1909 is larger than for any other state in the Union. The use of electric motors for the purpose of applying the power generated within the establishments is rapidly becoming more common, the horsepower of such motors having increased from 6,138 in 1899 to 27,147 in 1909.

Summary of Manufacturing Establishments, 1889-1914.
(From the Report of the Census Bureau.)

	Number or amount		
	1889	1909	1914
Number of establishments	4,997	7,659	10,057
Persons engaged in manufacture	*	141,576	176,547
Proprietors and firm members	*	8,077	10,429
Salaried employees	6,877	18,203	2,790
Wage earners (average number)	77,224	115,296	139,481
Primary horsepower	126,953	329,100	491,025
Capital	$175,468,000	$537,134,000	$736,105,455
Expenses	$225,404,000	$476,154,000	------------
Services—			
Salaries	$7,495,000	$22,955,000	$35,230,010
Wages	$39,890,000	$84,142,000	$105,612,681
Materials	$164,894,000	$325,238,000	$447,474,531
Miscellaneous	$13,125,000	$43,819,000	------------
Value of products	$257,386,000	$529,761,000	$712,800,764
Value added by manufacture (value of products less cost of materials)	$92,492,000	$204,523,000	$265,326,233

*Figures not available.

Fuel. Of the fuel consumed in generating this power, a notable fact is the large amount of oil and the small amounts of nearly all other kinds of fuel used. The larger part of this oil is crude oil used as fuel in the generation of steam power, but increasing quantities of refined oil are being used in internal-combustion engines.

Anthracite coal, tons	4,421
Bituminous coal, tons	43,165
Coke, tons	113,665
Wood, cords	76,323
Oil, including gasoline, barrels	8,883,015
Gas, 1,000 feet	302,548

MANUFACTURING IN CALIFORNIA, 1889-1914.

The growth of manufacturing in California has made rapid progress as is shown by the following summary:*

	1889	1909	1914
Number of establishments	12,582	7,659	10,057
Capital invested	$205,395,025	$537,134,000	$736,105,455
Average number of wage earners	91,047	115,296	139,481
Total salaries and wages	$47,425,947	$107,097,000	$140,842,691
Cost of materials used	$188,125,602	$325,238,000	$447,474,531
Value of products	$302,874,761	$529,761,000	$712,800,764

*For statistics of the years 1850-1890, see Report for 1913, page 214, the returns for 1914 not yet issued in detail.

Laundries, 1909-1914.

Statistics for steam laundries are not included in these tables, or in the totals for manufacturing industries. In 1909 there were 321 such establishments in California, 87 of which were in San Francisco, 41 in Oakland, 31 in Los Angeles, and 10 in Sacramento.

The following statement summarizes the statistics:

	1909	1914
Number of establishments	321	532
Persons engaged in the industry	9,060	
Proprietors and firm members	308	
Salaried employees	714	
Wage earners (average number)	8,038	10,416
Primary horsepower	8,961	13,503
Capital	$6,295,915	$9,618,000
Expenses	8,177,759	
Services	5,260,743	
Material	1,612,112	2,262,000
Miscellaneous	1,304,904	
Amount received for work done	9,541,795	13,949,000

Fourteen Leading Manufacturers, 1909.

Industry	Number of establishments	Persons engaged*	Salaries	Wages	Capital	Value of product
Automobiles	41	589	$71,000	$368,000	$701,000	$1,470,000
Butter, cheese and condensed milk	161	918	202,000	466,000	2,829,000	12,761,000
Canning and preserving	196	8,714	1,080,000	3,454,000	18,316,000	32,915,000
Cars and steam railway shop construction and repairs	42	9,688	379,000	8,394,000	4,721,000	18,719,000
Cement	8	2,521	195,000	1,650,000	24,014,000	6,504,000
Flour mill and grist mill products	125	1,392	514,000	732,000	13,424,000	25,188,000
Foundry and machine shops	543	10,218	1,832,000	7,312,000	28,693,000	26,731,000
Gas, illuminating and heating	74	2,538	824,000	1,408,000	47,075,000	8,927,000
Leather, tanned, curried and finished	40	1,547	215,000	988,000	8,535,000	9,367,000
Malt liquors	83	1,626	545,000	1,391,000	18,804,000	9,319,000
Wines	181	1,691	429,000	682,000	20,189,000	8,937,000
Lumber and timber products	644	25,079	2,237,000	15,651,000	55,165,000	45,000,000
Petroleum, refining	29	1,146	367,000	801,000	13,881,000	17,878,000
Printing and publishing	1,240	12,215	3,829,000	6,432,000	17,198,000	25,032,000
Slaughtering and meat packing	94	2,135	550,000	1,307,000	11,463,000	34,280,000

*Includes proprietors and firm members, salaried employees, and wage earners.

Manufactures of Twenty-one Cities with a Population of Ten Thousand and Over, According to Their Relative Industrial Importance, 1889-1909.

(From the Report of the Census Bureau.)

	Capital		Average number of wage earners		Value of products	
	1899	1909	1899	1909	1899	1909
San Francisco†	$69,643,000	$133,824,000	32,555	28,244	$107,023,567	$133,041,069
Los Angeles	10,045,000	59,518,000	5,173	17,327	15,133,696	68,586,274
Oakland	5,173,000	19,113,000	2,476	6,905	5,368,258	22,342,926
Sacramento	6,856,000	10,097,000	3,686	4,514	9,494,633	13,976,911
Stockton	4,454,000	8,250,000	1,185	1,594	5,525,391	11,849,252
Fresno	1,435,000	4,933,000	819	1,938	2,752,201	11,090,195
San Jose	2,980,000	3,815,000	1,221	1,430	3,291,641	5,610,427
San Diego	990,000	5,326,000	255	1,071	669,682	4,740,990
Berkeley	456,000	3,465,000	211	1,084	651,286	4,435,374
Eureka	*	3,306,000	*	946	*	3,011,682
Bakersfield	*	1,791,000	*	746	*	2,818,744
Alameda	749,000	3,002,000	372	915	1,335,326	2,554,417
Vallejo	*	1,559,000	*	203	*	1,895,562
Pasadena	313,000	1,347,000	177	499	330,578	1,724,364
San Bernardino	*	1,242,000	*	729	*	1,659,705
Riverside	*	1,102,000	*	267	*	1,177,962
Santa Barbara	*	895,000	*	265	*	1,169,195
Santa Cruz	*	2,605,000	*	274	*	1,161,269
Long Beach	*	1,326,000	*	277	*	927,180
Pomona	*	630,000	*	224	*	559,661
Redlands	*	1,104,000	*	147	*	518,320

†The remarkable increases shown for Alameda and Berkeley, and also for Oakland, are doubtless due largely to the influx of population and business from San Francisco following the earthquake in 1906.

*Figures not available.

Engines and Power, 1899-1909.

Power	Number of engines or motors		Horsepower		Per cent distribution of horsepower	
	1899	1909	1899	1909	1899	1909
Owned:						
Steam	2,158	2,520	105,190	193,526	82.9	58.8
Gas	545	765	3,244	10,115	2.6	3.1
Water wheels	171	115	4,680	7,390	3.7	2.2
Water motors	*	47	*	280	*	0.1
Other	---------	---------	1,609	30	1.3	*
Totals	2,874	3,447	114,723	211,341	90.4	64.2
Rented:						
Electric	*	10,802	9,624	116,537	7.6	35.4
Other	---------	---------	2,606	1,222	2.1	0.4
Totals	2,874	14,249	12,230	329,100	100.0	100.0
Electric motors:						
Run by current generated by establishment	281	1,591	6,138	27,147	38.9	18.9
Run by rented power	*	10,802	9,624	116,537	61.1	81.1
Totals	281	12,393	15,762	143,684	100.0	100.0

*Not reported.

MANUFACTURES IN CERTAIN CITIES IN 1914.

ALAMEDA.

The population of Alameda at the census of 1910 was 23,383, and it is estimated that it was 26,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

The salaries and wages amounted to $1,239,000 in 1914, and to $966,000 in 1909, the increase being $273,000, or 28.3 per cent.

The number of salaried employees was 127 in 1914, as compared with 111 in 1909, making an increase of 16, or 14.4 per cent.

The average number of wage earners was 1,092 in 1914, and 915 in 1909, the increase being 177, or 19.3 per cent.

A comparative summary for the city for 1909 and 1914 follows:

Alameda	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	53	51	-----------
Persons engaged in manufactures	1,267	1,076	17.8
Proprietors and firm members	48	50	-----------
Salaried employees	127	111	14.4
Wage earners (average number)	1,092	915	19.3
Primary horsepower	3.493	1,526	128.9
Capital	$3,737,000	$3,002,000	24.5
Services	1,239,000	966,000	28.3
Salaries	210,000	170.000	23.5
Wages	1,029,000	796,000	29.3
Materials	1,005,000	929,000	8.2
Value of products	2,794,000	2,554,000	9.4
Value added by manufacture (value of products less cost of materials)	1,789,000	1,625,000	10.1

BERKELEY.

The population of Berkeley at the census of 1910 was 40,434, and it is estimated that it was 52,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that the manufacturers have increased since 1909.

The salaries and wages amounted to $1,513,000 in 1914 and to $1,094,000 in 1909, the increase being $419,000, or 38.3 per cent.

The number of salaried employees was 318 in 1914, as compared with 221 in 1909, making an increase of 97, or 43.9 per cent.

The average number of wage earners was 1,328 in 1914 and 1,084 in 1909, the increase being 244, or 22.5 per cent.

A comparative summary for the city for 1909 and 1914 follows:

Berkeley	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	95	84	----------
Persons engaged in manufactures	1,724	1,420	21.4
Proprietors and firm members	78	115	----------
Salaried employees	318	221	43.9
Wage earners (average number)	1,328	1,084	22.5
Primary horsepower	3,503	2,433	44.0
Capital	$5,814,000	$3,465,000	67.8
Services	1,513,000	1,094,000	38.3
Salaries	459,000	254,000	80.7
Wages	1,054,000	840,000	25.5
Materials	4,769,000	2,687,000	77.5
Value of products	7,321,000	4,435,000	65.1
Value added by manufacture (value of products less cost of materials)	2,552,000	1,748,000	46.0

OAKLAND.

The population of Oakland at the census of 1910 was 150,174, and it is estimated that it was 183,000 on July 1, 1914.

The statistics represent the establishments located with the corporate limits of the city and show that the manufactures have increased since 1909. In the order of their importance, from a percentage standpoint, the increases for the several items rank as follows: Capital, 90.5 per cent; primary horsepower, 38.5 per cent; salaried employees, 32.3 per cent; salaries, 30.7 per cent; number of establishments, 29.9 per cent; value added by manufacture, 28.8 per cent; value of products, 27.7 per cent; materials, 26.6 per cent; wages, 12.2 per cent; wage earners, 11.4 per cent; and proprietors and firm members, 4.5 per cent.

A comparative summary for the city for 1909 and 1914 follows:

Oakland	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	573	441	29.9
Persons engaged in manufactures	9,699	8,538	13.6
Proprietors and firm members	579	554	4.5
Salaried employees	1,428	1,079	32.3
Wage earners (average number)	7,692	6,905	11.4
Primary horsepower	18,950	13,683	38.5
Capital	$36,411,000	$19,113,000	90.5
Services	7,667,000	6,618,000	15.9
Salaries	1,701,000	1,301,000	30.7
Wages	5,966,000	5,317,000	12.2
Materials	14,999,000	11,847,000	26.6
Value of products	28,522,000	22,343,000	27.7
Value added by manufacture (value of products less cost of materials)	13,523,000	10,496,000	28.8

FRESNO.

The population of Fresno at the census of 1910 was 24,892 and it is estimated that it was 30,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	117	76	----------
Persons engaged in manufactures	3,330	2,262	47.2
Proprietors and firm members	95	43	----------
Salaried employees	332	281	18.1
Wage earners (average number)	2,903	1,938	49.8
Primary horsepower	4,080	3,403	19.9
Capital	$7,375,000	$4,933,000	49.5
Services	1,965,000	1,431,000	37.3
Salaries	454,000	328,000	38.4
Wages	1,511,000	1,103,000	37.0
Materials	12,171,000	7,992,000	52.3
Value of products	16,520,000	11,090,000	49.0

EUREKA.

The population of Eureka at the census of 1910 was 11,845 and it is estimated that it was 14,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

A comparative summary for the city for 1909 and 1914 follows:

	Census—	
	1914	1909
Number of establishments	57	48
Persons engaged in manufactures	928	1,075
Proprietors and firm members	46	30
Salaried employees	83	99
Wage earners (average number)	799	946
Primary horsepower	3,707	3,901
Capital	$2,976,000	$3,306,000
Services	729,000	797,000
Salaries	124,000	124,000
Wages	605,000	673,000
Materials	1,217,000	1,494,000
Value of products	2,480,000	3,012,000

BAKERSFIELD.

The population of Bakersfield at the census of 1910 was 12,727, and it is estimated that it was 16,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

The salaries and wages amounted to $1,026,000 in 1914 and to $758,000 in 1909, the increase being $268,000, or 35.4 per cent.

The number of salaried employees was 109 in 1914, as compared with 78 in 1909, making an increase of 31.

The average number of wage earners was 895 in 1914 and 746 in 1909, the increase being 149, or 20 per cent.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	51	27	----------
Persons engaged in manufactures	1,046	844	23.9
Proprietors and firm members	42	20	----------
Salaried employees	109	78	----------
Wage earners (average number)	895	746	20.0
Primary horsepower	2,450	910	169.2
Capital	$2,749,000	$1,791,000	53.5
Services	1,026,000	758,000	35.4
Salaries	147,000	94,000	56.4
Wages	879,000	664,000	32.4
Materials	1,623,000	1,700,000	—4.5
Value of products	2,928,000	2,819,000	3.9

A minus sign (—) denotes decrease.

LOS ANGELES.

The population of Los Angeles at the census of 1910 was 319,198, and it is estimated that it was 439,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	1,911	1,325	44.2
Persons engaged in manufactures	31,532	21,875	44.1
Proprietors and firm members	1,767	1,181	49.6
Salaried employees	6,029	3,367	79.1
Wage earners (average number)	23,744	17,327	37.0
Primary horsepower	64,665	33,166	95.0
Capital	$101,681,000	$59,518,000	70.8
Services	26,025,000	16,500,000	57.7
Salaries	7,748,000	3,912,000	98.0
Wages	18,277,000	12,588,000	45.2
Materials	58,941,000	38,913,000	51.5
Value of products	103,458,000	68,586,000	50.8
Value added by manufacture (value of products less cost of materials)	44,517,000	29,673,000	50.0

POMONA.

The population of Pomona at the census of 1910 was 10,207 and it is estimated that it was 12,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	54	30	----------
Persons engaged in manufactures	459	285	61.0
Proprietors and firm members	63	32	----------
Salaried employees	74	29	----------
Wage earners (average number)	322	224	43.8
Primary horsepower	806	334	141.3
Capital	$1,192,000	$629,000	89.5
Services	275,000	173,000	59.0
Salaries	61,000	21,000	190.5
Wages	214,000	152,000	40.8
Materials	324,000	230,000	40.9
Value of products	825,000	559,000	47.6
Value added by manufacture (value of products less cost of materials)	501,000	329,000	52.3

LONG BEACH.

The population of Long Beach at the census of 1910 was 17,809, and it is estimated that it was 24,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	94	51	----------
Persons engaged in manufactures	1,128	413	173.1
Proprietors and firm members	82	49	----------
Salaried employees	161	87	----------
Wage earners (average number)	885	277	219.5
Primary horsepower	2,999	1,450	106.8
Capital	$3,229,000	$1,326,000	143.5
Services	805,000	294,000	173.8
Salaries	199,000	87,000	128.7
Wages	606,000	207,000	192.8
Materials	1,546,000	498,000	210.4
Value of products	2,945,000	927,000	217.7
Value added by manufacture (value of products less cost of materials)	1,399,000	429,000	226.1

PASADENA.

The population of Pasadena at the census of 1910 was 30,291, and it is estimated that it was 41,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	118	88	----------
Persons engaged in manufactures	821	708	16.0
Proprietors and firm members	120	92	----------
Salaried employees	148	117	26.5
Wage earners (average number)	553	499	10.8
Primary horsepower	1,782	969	83.9
Capital	$1,601,000	$1,347,000	18.8
Services	585,000	497,000	17.7
Salaries	156,000	117,000	33.3
Wages	429,000	380,000	12.9
Materials	869,000	853,000	1.9
Value of products	1,972,000	1,724,000	14.4
Value added by manufacture (value of products less cost of materials)	1,103,000	871,000	26.6

RIVERSIDE.

The population of Riverside at the census of 1910 was 15,212, and it was estimated that it was 18,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	69	52	
Persons engaged in manufactures	1,043	393	165.4
Proprietors and firm members	66	55	
Salaried employees	139	75	
Wage earners (average number)	838	263	218.6
Primary horsepower	7,952	675	1,078.1
Capital	$6,851,000	$1,084,000	532.0
Services	704,000	259,000	171.8
Salaries	203,000	49,000	314.3
Wages	501,000	210,000	138.6
Materials	1,093,000	523,000	109.0
Value of products	2,307,000	1,013,000	127.7
Value added by manufacture (value of products less cost of materials)	1,214,000	490,000	147.8

SACRAMENTO.

The population of Sacramento at the census of 1910 was 44,696, and it is estimated that it was 63,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	236	212	11.3
Persons engaged in manufactures	6,148	5,275	16.5
Proprietors and firm members	257	219	17.4
Salaried employees	557	535	4.1
Wage earners (average number)	5,334	4,521	18.0
Primary horsepower	13,909	8,567	62.4
Capital	$13,593,000	$10,128,000	34.2
Services	4,827,000	4,545,000	6.2
Salaries	664,000	621,000	6.9
Wages	4,163,000	3,924,000	6.1
Materials	9,050,000	6,902,000	31.1
Value of products	16,383,000	14,006,000	17.0
Value added by manufacture (value of products less cost of materials)	7,333,000	7,104,000	3.2

SAN BERNARDINO.

The population of San Bernardino at the census of 1910 was 12,779, and it is estimated that it was 16,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	54	41	----------
Persons engaged in manufactures	1,283	883	45.3
Proprietors and firm members	50	38	----------
Salaried employees	156	116	34.5
Wage earners (average number)	1,077	729	47.7
Primary horsepower	1,715	1,411	21.5
Capital	$1,392,000	$1,242,000	12.1
Services	1,005,000	734,000	36.9
Salaries	180,000	95,000	89.5
Wages	825,000	639,000	29.1
Materials	1,420,000	763,000	86.1
Value of products	2,613,000	1,660,000	57.4
Value added by manufacture (value of products less cost of materials)	1,193,000	897,000	33.0

REDLANDS.

The population of Redlands at the census of 1910 was 10,449, and it is estimated that it was 13,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city.

A comparative summary for the city for 1909 and 1914 follows:

	Census—	
	1914	1909
Number of establishments	28	37
Persons engaged in manufactures	177	260
Proprietors and firm members	25	36
Salaried employees	45	77
Wage earners (average number)	107	147
Primary horsepower	379	439
Capital	$669,000	$1,104,000
Services	129,000	147,000
Salaries	48,000	47,000
Wages	81,000	100,000
Materials	215,000	239,000
Value of products	522,000	518,000

SAN DIEGO.

The population of San Diego at the census of 1910 was 39,578, and it is estimated that it was 49,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	257	117	119.6
Persons engaged in manufactures	2,976	1,440	106.7
Proprietors and firm members	244	99	146.5
Salaried employees	672	270	148.9
Wage earners (average number)	2,060	1,071	92.3
Primary horsepower	6,754	3,269	106.6
Capital	$10,866,000	$5,326,000	104.0
Services	2,237,000	1,069,000	109.3
Salaries	668,000	263,000	154.0
Wages	1,569,000	806,000	94.7
Materials	4,582,000	2,667,000	71.8
Value of products	9,021,000	4,741,000	90.3
Value added by manufacture (value of products less cost of materials)	4,439,000	2,074,000	114.2

SAN FRANCISCO.

The population of San Francisco at the census of 1910 was 416,912, and it is estimated that it was 448,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	2,334	1,796	30.0
Persons engaged in manufactures	42,089	36,910	14.0
Proprietors and firm members	2,932	2,544	15.2
Salaried employees	7,399	6,122	20.9
Wage earners (average number)	31,758	28,244	12.4
Primary horsepower	61,838	49,934	23.8
Capital	$145,622,000	$133,824,000	8.8
Services	35,385,000	30,467,000	16.1
Salaries	10,096,000	8,086,000	24.9
Wages	25,289,000	22,381,000	13.0
Materials	97,040,000	76,217,000	27.3
Value of products	162,300,000	133,041,000	22.0
Value added by manufacture (value of products less cost of materials)	65,260,000	56,824,000	14.8

STOCKTON.

The population of Stockton at the census of 1910 was 23,253, and it is estimated that it was 26,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city and show that there was a slight decrease in the capital invested, materials, and value of products for 1914 as compared with 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	157	142	10.6
Persons engaged in manufactures	2,605	2,008	29.7
Proprietors and firm members	161	139	15.8
Salaried employees	467	298	56.7
Wage earners (average number)	1,977	1,571	25.8
Primary horsepower	5,147	4,971	3.5
Capital	$7,762,000	$8,144,000	—4.7
Services	2,192,000	1,657,000	32.3
Salaries	588,000	370,000	58.9
Wages	1,604,000	1,287,000	24.6
Materials	7,432,000	7,997,000	—7.1
Value of products	11,293,000	11,470,000	—1.5

Minus sign (—) denotes decrease.

SANTA BARBARA.

The population of Santa Barbara at the census of 1910 was 11,659, and it is estimated that it was 14,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	49	49	----------
Persons engaged in manufactures	495	340	45.6
Proprietors and firm members	46	43	----------
Salaried employees	71	58	----------
Wage earners (average number)	378	239	58.2
Primary horsepower	837	452	85.2
Capital	$1,033,000	$758,000	36.3
Services	578,000	224,000	158.0
Salaries	117,000	44,000	165.9
Wages	461,000	180,000	156.1
Materials	395,000	439,000	—10.0
Value of products	1,271,000	843,000	50.8
Value added by manufacture (value of products less cost of materials)	876,000	404,000	116.8

Minus sign (—) denotes decrease.

SAN JOSE.

The population of San Jose at the census of 1910 was 28,946, and it is estimated that it was 37,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	225	149	51.0
Persons engaged in manufactures	2,635	1,790	47.2
Proprietors and firm members	229	134	70.9
Salaried employees	377	257	46.7
Wage earners (average number)	2,029	1,399	45.0
Primary horsepower	3,847	1,668	130.6
Capital	$12,212,000	$3,483,000	250.6
Services	1,747,000	1,109,000	57.5
Salaries	420,000	237,000	77.2
Wages	1,327,000	872,000	52.2
Materials	7,146,000	3,205,000	123.0
Value of products	10,806,000	5,483,000	97.1
Value added by manufacture (value of products less cost of materials)	3,660,000	2,278,000	60.7

SANTA CRUZ.

The population of Santa Cruz at the census of 1910 was 11,146, and it is estimated that it was 13,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	80	34	----------
Persons engaged in manufactures	558	388	43.8
Proprietors and firm members	94	31	----------
Salaried employees	62	83	----------
Wage earners (average number)	402	274	46.7
Primary horsepower	2,832	1,827	55.0
Capital	$3,212,000	$2,605,000	23.3
Services	326,000	287,000	13.6
Salaries	60,000	77,000	−22.1
Wages	266,000	210,000	26.7
Materials	745,000	667,000	11.7
Value of products	1,324,000	1,161,000	14.0
Value added by manufacture (value of products less cost of materials)	579,000	494,000	17.2

Minus sign (—) denotes decrease.

VALLEJO.

The population of Vallejo at the census of 1910 was 11,340, and it is estimated that it was 13,000 on July 1, 1914.

The statistics represent the establishments located within the corporate limits of the city, and show that the manufactures have increased since 1909.

A comparative summary for the city for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	29	23	
Persons engaged in manufactures	355	271	31.0
Proprietors and firm members	30	22	
Salaried employees	33	46	
Wage earners (average number)	292	203	43.8
Primary horsepower	1,656	1,616	2.5
Capital	$1,667,000	$1,559,000	6.9
Services	293,000	259,000	13.1
Salaries	46,000	75,000	—38.7
Wages	247,000	184,000	34.2
Materials	2,046,000	1,404,000	45.7
Value of products	3,072,000	1,896,000	62.0
Value added by manufacture (value of products less cost of materials)	1,026,000	492,000	108.5

Minus sign (—) denotes decrease.

SUMMARY FOR THE STATE.

A comparative summary for the state for 1909 and 1914 follows:

	Census—		Per cent of increase, 1909-1914
	1914	1909	
Number of establishments	10,057	7,659	31.3
Persons engaged in manufactures	176,548	141,576	24.7
Proprietors and firm members	10,430	8,077	29.1
Salaried employees	26,637	18,203	46.3
Wage earners (average number employed during the year)	139,481	115,296	21.0
Wage earners, by months:			
January	119,688	94,747	
February	121,611	94,252	
March	126,749	100,372	
April	135,252	108,437	
May	140,981	115,839	
June	144,762	119,911	
July	157,054	124,886	
August	161,072	131,202	
September	159,574	132,280	
October	152,431	129,864	
November	132,945	121,486	
December	121,653	110,281	
Primary horsepower	491,025	329,100	49.2
Capital	$736,105,000	$537,134,000	37.0
Services	140,843,000	107,097,000	31.5
Salaries	35,230,000	22,955,000	53.5
Wages	105,613,000	84,142,000	25.5
Materials	447,475,000	325,238,000	37.6
Value of products	712,801,000	529,761,000	34.6
Value added by manufacture (value of products less cost of materials)	265,326,000	204,523,000	29.7

State Summary, 1899-1914.

Census year	Number of establishments	Wage earners (average number)	Primary horsepower	Capital	Wages	Materials	Value of products
				Expressed in thousands			
1914	10,057	139,481	491,025	736,106	105,613	447,474	712,801
1909	7,659	115,296	329,100	537,134	84,142	325,238	529,761
1904	6,839	100,355	210,359	282,647	64,657	215,726	367,218
1899	4,997	77,224	126,953	175,468	39,890	164,894	257,386

PART XI.

TRANSPORTATION BY WATER; RIVER TRAFFIC AND PUBLIC ROADS.

The Sacramento River—Flood Control; Navigability of the Sacramento River; Traffic on the Sacramento, San Joaquin and Mokelumne Rivers. Navigable Streams, Length and Depth at Low Water; Public Roads; Mileage of Roads by Counties. Increase of Motor Vehicles in United States; Number of Automobiles in California by Counties, 1914-1916; Number of Motorcycles, 1914-1916; Total Receipts by Counties, 1916.

TRANSPORTATION BY WATER.*

The largest volume of unused water in California comes from the Sacramento and San Joaquin valleys, and it is here that the greatest development in the future will take place. It is not believed that this increased use of water will seriously injure navigation interests, because a large percentage of the water diverted will return to the streams as waste seepage.

The complete utilization of these two rivers will give California the largest rural population of any state in the Union. Whatever expenditure is necessary to protect navigation interests, and enable this to be brought about should be made. Even if it requires the construction of locks and the canalizing of both streams, the improvements will be well worth their cost, and as it is a recognized field for the expenditure of government appropriations, a proper presentation of the situation should prove successful. The above is the opinion of such a high authority as Prof. Elwood Mead.

San Francisco Bay, which has an area of about 450 square miles, is by far the most important harbor of the state.

The Sacramento and San Joaquin Valleys.

The greater portion of the arable section of California is comprised in an immense valley about 400 miles long and 40 miles wide. It is inclosed on the east and west by the Sierra Nevada and Coast Range mountains, respectively. The two converge above Red Bluff in the north, while the southern boundary is formed by the Tehachapi Range, joining the Coast Range and the Sierra Nevada below Bakersfield. On the earlier maps of the United States Geological Survey this valley is called "The Great Interior Valley." Today it is known in its northern part as the Sacramento and in its southern part as the San Joaquin Valley, the first containing about 3,000,000 acres and the latter about 7,000,000 acres. There is no distinguishable dividing line between the two, though the Cosumnes River is usually accepted as such line.

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*See Supplemental Report on Flood Control of the Sacramento River, submitted by Mr. Curry, House of Representatives, House Report No. 616.

The upper portion of the Great Valley is drained by the Sacramento River, flowing south, and the lower portion by the San Joaquin, flowing north. The two rivers have a common delta, and their main streams, flowing on opposite sides of Sherman Island, empty side by side into Suisun Bay, an arm of San Francisco Bay, 61 miles from the sea. Because of their common delta and the difference in volume of their floods, the San Joaquin in the lower 45 miles of its course is subject to flood and injury from the Sacramento.

In the early pioneer days the Sacramento River was a perfectly clear stream with pebbly bottom. From 1850 to perhaps 1865 it was navigable at all seasons of the year for seagoing craft drawing from 9 to 13 feet of water up as far as Sacramento and, for the earlier part of the period named, some little distance beyond Sacramento. Indeed, most of the steamers which plied on the river in those days had to be seagoing craft, for they made their way to California from east Atlantic ports around Cape Horn or through the Straits of Magellan.

Sacramento River Flood Control.

What the completion of the Sacramento River flood-control project means to the state and the nation is indicated by the statement that only through this plan can flood control of the Sacramento River be secured; and that only through flood control thereof can the following results be attained:

(*a*) Restoration and maintenance of navigability of the Sacramento River, on which, in earlier days, ocean freighters drawing 13 feet of water used to deliver their cargoes at Sacramento city, 125 miles from the sea, at all seasons of the year.

(*b*) Protection of the San Joaquin River, which has a common delta with the Sacramento and which is threatened by floods from the Sacramento up to and including the city of Stockton, at the practical head of navigation, 45 miles from the river's mouth, 106 miles from the sea.

(*c*) Maintenance of an inland waterway system, of which the two navigable rivers must be necessarily main arteries. Upon such a waterway system depends in large measure future development of the Sacramento and San Joaquin valleys and the commerce of the San Joaquin today is limited practically to that stretch of the river lying between its mouth and the city of Stockton, a distance of 45 miles, the Government maintaining therein, under existing project, a channel depth of 9 feet. The river is navigable, however, for 15 miles above Stockton. The navigability of the upper river has been practically destroyed by the demands made upon its sources of supply for water for irrigation. In the San Joaquin Valley the volume of available water is less and the quantity of land to be irrigated much greater than in the Sacramento Valley.*

RIVER TRAFFIC.

Navigability of the Sacramento River.

That portion of the Sacramento River below Red Bluff is considered a navigable stream.

Between Chico Landing and Sacramento the annual tonnage handled by river boats has averaged 120,000 tons of an aggregate annual value of $6,000,000, but the tonnage handled between Red Bluff and Chico

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*See Supplemental Report on Flood Control of the Sacramento River, submitted by Mr. Curry, House of Representatives, House Report No. 616.

Landing has been relatively very light and constantly tending to decline.

The Sacramento River has a good navigable channel below Colusa. The following shows the low-water depths below Red Bluff, the head of navigation:

Below Sacramento, 64 miles, 7 feet minimum depth.
Sacramento to Colusa, 90 miles, 4 feet minimum depth.
Colusa to Chico, 57 miles, 3 feet mimimum depth.
Chico to Red Bluff, 52 miles, 3 feet for about 6 months; 1½ to 2 feet for about 6 months.

Traffic on Sacramento, San Joaquin, and Mokelumne Rivers.

The commerce on the Sacramento River consists mostly of grain, lumber, fruit, vegetables and general merchandise. The following is a comparative statement of the amount and value of this traffic for the last three calendar years.

Year	Short tons	Value
1912	477,292	$27,755,325
1913	733,594	35,856,791
1914	721,090	38,211,760

San Joaquin River.

The commerce for the calendar year 1914 amounted to 772,156 short tons, valued at $35,479,741, and consisted principally of grain, potatoes, onions, beans, and general merchandise.

Year	Short tons	Value
1912	632,591	$38,854,539
1913	820,399	38,341,174
1914	772,156	35,479,741

Tonnage of All Freight and of Grain and Live Stock Carried on San Joaquin and Sacramento Rivers, 1900-1908.

(Tons of 2,000 pounds.)

Year	San Joaquin River, all freight, tons	Sacramento River, all freight, tons
1900	270,887	461,314
1901	357,746	452,965
1902	322,000	404,900
1903	366,038	383,724
1904	360,486	353,164
1905	373,186	365,957
1906	440,300	375,000
1907	736,472	267,224
1908	509,233	394,945

Mokelumne River.

The commerce for the calendar year 1914 amounted to 69,783 short tons valued at $3,045,870, and consisted principally of barley, beans, potatoes, vegetables, sheep, canned goods, and general merchandise.

Year	Short tons	Value
1912	50,443	$2,833,704
1913	90,585	5,079,932
1914	69,783	3,045,870

The high class of freight handled on the San Joaquin and Sacramento rivers is a noticeable feature, the value averaging $50 per ton, almost the highest, if not the highest, reported on any river in the United States. Ninety per cent of all freight between Sacramento and San Francisco and between Stockton and San Francisco is handled by boat, the average rate being 35 per cent less than by rail.

In the lower part of the Sacramento and San Joaquin valleys there are islands varying in area from 1,500 to 43,000 acres, most of which have been reclaimed for agricultural purposes. This overflow land (swamp land) is probably as good and as productive as any in the state of California. Reclaimed lands that are improved, *i. e.*, hop vineyards, orchards, asparagus and alfalfa lands, etc., are now valued as high as $300 or more per acre, while the average value of the reclaimed land along the 65 miles of the river below Sacramento is about $200 per acre.

Sacramento River.

Number of Vessels, Registered Tonnage and Number of Passengers.

Class	Number	Net registered tonnage	Passengers
Registered:			
Steamers	41	18,789	139,816
Gas	49	1,421	34,410
Sailing	37	2,193	
Unrigged	45	12,004	
Unregistered:			
Gas	22		1,259
Sailing	3		
Unrigged	13		
Totals	210	34,407	175,485

During the spring of 1915 a new line of boats began operating upon the Sacramento River. Two gas schooners make a daily trip from San Francisco to Courtland and return, hauling fruit, vegetables, and other freight.

Through the Northern Electric Railway drawbridge at M street, Sacramento, 3,054 steamboats, 1,005 barges, 969 gas boats, 73 sailing vessels, 30 dredges, and 29 pile drivers passed during the year.

Through the Southern Pacific Railway drawbridge at H street, Sacramento, 895 steamboats, 799 barges, 867 gas boats, 31 sailboats, 27 dredges and 20 pile drivers passed during the year. (Between M and H streets, Sacramento, the project depth changes from 7 feet to 4 feet.)

Through the Southern Pacific Railway drawbridge at Knights Landing, 553 steamboats, 408 barges, 321 gas boats, 6 sailboats, 8 dredges and 7 pile drivers passed during the year.

Through the Northern Electric Railway drawbridge at Meridian, 424 steamboats, 196 barges, 15 gas boats, 2 sailboats, and 9 dredges passed during the year.

In the above only those passages for which draw operation was required are tabulated.

San Joaquin River.

Class	Number	Net registered tonnage	Passengers
Registered:			
Steamers	22	7,373	72,313
Gas	64	1,030	110,343
Sailing	28	1,509	----------
Unrigged	39	6,033	----------
Unregistered:			
Gas	13	----------	7,011
Sailing	5	----------	----------
Unrigged	21	----------	----------
Totals	192	15,945	189,667

Mokelumne River.

Class	Number	Net registered tonnage	Passengers
Registered:			
Steamers	7	2,185	1,326
Gas	28	345	----------
Sailing	5	217	----------
Unrigged	16	1,720	----------
Unregistered:			
Gas	5	----------	668
Sailing	3	----------	----------
Unrigged	8	----------	----------
Totals	72	4,467	1,994

NOTE.—Through the Southern Pacific Railway bridge over Snodgrass Slough, a tributary of the Mokelumne River, 60 gas boats, 2 sailing vessels, 46 barges, and 6 dredges passed during the year.

Navigable Streams—Length and Depth at Low Water.

Name and points connecting	Distance in miles	Navigable length	Depth at low water, feet	Traffic, tons	
				In 1905	In 1906
Redwood Creek:					
Mouth to Redwood	----------	1.0	3.0	47,700	----------
San Joaquin River:					
Mouth to Stockton	----------	40	8.0	----------	971,382
Stockton to railroad crossing	----------	----------	3.0	----------	----------
Stockton to Firebaugh	----------	----------	A few inches	----------	----------
Mokelumne River:					
Mouth to Galt	----------	20.0	2.0	----------	50,000 to 100,000
Mouth to Snodgrass Slough	13.0	----------	6.0	----------	
Sacramento River:					
Mouth to Red Bluff	----------	262.0	2.5	----------	375,000 *
Mouth to Sacramento	64.0	----------	7.0	----------	
Sacramento to Red Bluff	198.0	----------	2.5	----------	
Feather River:					
Mouth to Marysville	----------	30.0	1 to 2	5,306	----------
Petaluma Creek:					
Mouth to Petaluma	----------	16.0	4.0	----------	175,025
Napa River:					
Mouth to Napa	----------	16.0	4.0	----------	182,642

*Steamboat lines only.

Depth of Channel and Distance From Open Sea for California Ports.

Port	Location	Distance from open sea, nautical miles	Depth of channel		
			Mean low water, feet	Mean high water, feet	Remarks
Eureka	Humboldt Bay	5.5	18½	24	
San Francisco	San Francisco Bay	14.8	18½	24	
Oakland	San Francisco Bay	14.8	18½	24	
Monterey	Bay of Monterey	3.0			At wharves, 15 to 36 feet.
Port Harford	On the sea		27		
Santa Barbara	On the sea		25		
Los Angeles ports:					
Port Los Angeles	On the sea		34		
Redondo Beach	On the sea				At wharves, 15 to 48 feet.
San Pedro	San Pedro Harbor	1.9	20	25	
San Diego	San Diego Bay	6.1	25	29¾	

PUBLIC ROADS.

The total mileage of public roads in the United States, outside the limits of incorporated towns and cities, in 1915 was estimated as about 2,452,000 miles, and the total surfaced roads, 277,000 miles. In California the total mileage of all roads in 1915 was estimated as 61,038 miles, of which 13,000 were surfaced.

The practice of improving the earth roads by the use of oil in California has been, to a large extent, discontinued, and this has had the effect of cutting down the mileage of that class of roads considerably, and so reducing the total mileage of improved roads. The information from some of the counties is not altogether satisfactory, but the figures are as accurate and complete as it was possible to obtain at the time. California had, at the close of 1909, 48,069 miles of public roads, which exceeds the total mileage reported for 1904 by 1,416 miles.

Of the total mileage of public roads in the state in 1909, 579 miles were reported as having been surfaced with stone, 6,054 miles with gravel, 1,289 miles with sand clay, and 653 miles with oiled earth, making a total mileage of improved roads of 8,587, or 17.87 per cent. This is about 1 per cent less than was reported in 1904, and this decrease is due principally to the fact that the oiling of earth roads has been abandoned to a large extent, for while there were 2,541 miles of earth roads reported to have been oiled in 1904, there were only 653 miles of oiled roads reported in 1909.

The State Highway.

In 1909 the State Highway Act appropriated the sum of $18,000,000 for the construction of highways in California. Up to April 16, 1916, $16,119,583 had been expended with very satisfactory results, as the following summary will show:

Miles of road surveyed	2,280
Miles of right of way secured	1,705
Acres of right of way secured	13,327
Miles of highway constructed.	
Oiled macadam	129
Concrete pavement	933
Asphalt	33
Graded	395
Total	1,490
Miles of road paved by counties and taken over, improved and maintained by the state	108

State Highway Mileage, January 1, 1916.*

Total all surfaced roads in state (approximate)	13,000
Total all public rural roads in state	61,038
Percentage of surfaced roads in state	21.3
State and state-aid roads built in 1915	527
Total all state and state-aid roads built to January 1, 1916	1,651
Roads maintained with state aid, 1915 (approximate)	1,000

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*U. S. Department of Agriculture Circular 63.

TABLE XXXVII.

Mileage of Public Roads Outside of Incorporated Cities and Towns, 1914.

County	Total mileage of all roads	Surfaced roads									Graded and drained earth
		Concrete	Macadam	Bituminous macadam	Gravel	Sand clay	Oiled earth	Total of surfaced roads	Percentage of roads surfaced	Increase in surfaced mileage over 1909	
Alameda	533	33.79	62.7	17.33	215.09			328.91	61.75	96.09	84.65
Alpine	200										
Amador	580									35	
Butte	1,200	12.8	5		400			417.8	34.81	12 8	
Calaveras	600									45	40
Colusa	1,169	11			556			567	48.5	265	563
Contra Costa	635	5.4	300	30				335.4	52.78	185.4	100
Del Norte	120									42.5	94
El Dorado	900	6		6				12	1.33	7	300
Fresno	3,800	27	14	1			1,080	1,122	29.52	952	1,960
Glenn	1,368	27.5		.5	395			423	30.92	285	188
Humboldt	1,348		15		310	110		435	32.27	20	30
Imperial	590	11.7				6		17.7	3	17.7	345
Inyo	923										300
Kern	1,400	61.8					500	561.8	40.12	459.8	200
Kings[1]	500	9					92	101	20.2	9	
Lake	700				50			50	7.14	—110	150
Lassen	1,700									— 50	700
Los Angeles	3,500	50.8		409				459.8	13.13	—625.2	
Madera	1,250	17.1		34			7	58.1	4.64	28.1	940
Marin[2]	309										
Mariposa	460										
Mendocino	800	4		7.7				11.7	1.46	11.7	50
Merced	1,218	37			20	261.25		318.25	26.12	181.25	600
Modoc	650									— 10	300
Mono	425										
Monterey	1,090	20.7	50					70.7	6.48	— 29.3	467
Napa[1]	560	6.5	3		450			459.5	82.05	6.5	
Nevada	800		25					25	3.12	— 5	150
Orange	615	97		5			350	452	73.49	422	50
Placer	1,200	10.1	5					15.1	1.25	8.1	50
Plumas[2]	385				10			10	2.59		
Riverside	1,714	10.3		8				18.3	1.06	— 35.7	112
Sacramento	1,636	29.7	.7	82.97	10		50	173.37	10.59	67.37	500
San Benito	468	4.7	8	6.9	50	140		209.6	44.78	—100.4	160
San Bernardino	700	75		50	200		300	625	89.28	625	
San Diego	5,000	42.8		2.3				45.1	.9	—404.9	1,743
San Joaquin	1,350			34				34	2.51	— 3	294
San Luis Obispo	1,353	39.9					3	42.9	3.08	—120.1	750
San Mateo	284	40	23	32			25	120	42.25	—108	134
Santa Barbara	1,143	21.7		17			22.40	61.1	5.34	— 4.9	23.75
Santa Clara	675	45.1	250	42	92			429.1	63.57	—396.9	75
Santa Cruz	450		10	3	50			63	14	12.75	291
Shasta	1,800				65			65	3.61	—171	26.4
Sierra	379		5					5	1.31	5	50
Siskiyou	1,300		16.5		66			82.5	6.34	58	626
Solano	700	34.2	5	10			40	89.2	12.74	54.2	100
Sonoma	1,420	20.2						20.2	1.41	—724.8	1,400
Stanislaus	1,200	21.7		40	40			101.7	8.47	46.7	920
Sutter	375	12		15	65	40		132	35.2	74	100
Tehama	750	9	7		100			116	15.46	50	600
Trinity	400									— 5	248
Tulare	3,600	13.7					1,000	1,013.7	28.15	953.7	1,600
Tuolumne	860						20	20	23.25	— 47	740
Ventura	554	31.6	3					34.6	6.25	— 65.4	24.5
Yolo	800	25	15.5	15	419.5	25		500	62.5	107.5	200
Yuba	600	3.4	14	9.2				26.6	4.43	11.6	10
Total	61,039	929.19	837.4	877.9	3,563.59	582.25	3,489.40	10,279.73	16.84	1,691.98	18,389.3

[1] Concrete mileage reported by state geologist, balance 1909 figures. [2] No report; 1909 mileage.

NOTE.—For mileage, cost and description of roads in 1904 and 1909, see Report for 1915, pages 251–252.

MOTOR VEHICLES.

During the past ten years the state registration of motor cars, including commercial vehicles in the United States, has increased 5,000 per cent, or from about 48,000 in 1906 to 2,445,664 in 1915. In 42 states of the Union all, or the major portion, of the motor vehicle revenue must be expended for the construction, improvement, or maintenance of the public roads, or for the maintenance of the state highway department. The tendency to put the expenditure of this large and increasing revenue directly in the hands of the state highway departments of the various states is very marked. In 20 states all, or the major portion, of the net motor vehicle revenues are expended by or under the supervision or direction of the state highway department. In seven states, including California, one-half to one-fourth of the state motor vehicle revenues are expended either by or under the direct supervision of the state highway department, and the remainder by the local authorities. The last two years there were eight states having upwards of 100,000 motor cars registered.

State	Number of motor cars, 1915	Number of motor cars, 1916
New York	255,242	314,222
Illinois	180,832	248,429
Ohio	181,332	252,431
California	163,797	232,440
Pennsylvania	160,137	230,578
Iowa	145,109	198,587
Michigan	114,845	160,052
Massachusetts	102,633	136,809

Motor Vehicle Registration in the United States, 1915-1916.

(Compiled by U. S. Department of Agriculture.)

	Total United States, 1915	Total United States, 1916
Automobiles	*2,445,664	3,394,314
Motorcycles	199,329	250,820
Owners' and chauffeurs' licenses	620,288	890,567
Manufacturers' and dealers' licenses	30,064	41,275
Automobile fines to state road fund	$117,859	----------
Gross motor vehicle registration revenues	$18,245,713	$25,865,369

*Does not include motorcycles nor dealers' and manufacturers' licenses.

TABLE XXXVIII.

State Motor Vehicle Department of California.

Comparative statement of number of automobile registrations by counties for the years 1914, 1915 and 1916.

County	1914	1915	1916
Alameda	8,449	11,440	15,997
Alpine	9	11	15
Amador	165	241	418
Butte	1,019	1,363	2,035
Calaveras	155	225	391
Colusa	425	502	812
Contra Costa	930	1,232	2,045
Del Norte	56	96	144
El Dorado	154	203	333
Fresno	4,488	6,177	9,521
Glenn	490	558	860
Humboldt	994	1,259	1,717
Imperial	1,515	1,785	3,022
Inyo	187	247	465
Kern	2,521	3,320	5,592
Kings	870	1,144	1,738
Lake	168	234	319
Lassen	181	241	394
Los Angeles	43,099	55,217	74,709
Madera	343	435	716
Marin	686	833	1,221
Mariposa	44	86	164
Mendocino	463	627	961
Merced	634	883	1,353
Modoc	136	230	389
Mono	12	18	32
Monterey	892	1,048	1,766
Napa	687	883	1,155
Nevada	169	293	485
Orange	3,761	4,913	6,440
Placer	437	630	977
Plumas	98	148	266
Riverside	2,128	2,844	3,934
Sacramento	3,419	4,655	6,415
San Benito	328	471	636
San Bernardino	3,198	4,404	6,249
San Diego	5,665	7,232	9,271
San Francisco	12,081	17,763	24,783
San Joaquin	2,500	3,644	5,671
San Luis Obispo	661	978	1,579
San Mateo	1,258	1,500	2,054
Santa Barbara	1,796	2,469	3,885
Santa Clara	3,941	5,275	7,488
Santa Cruz	986	1,173	1,663
Shasta	340	401	643
Sierra	64	72	104
Siskiyou	379	563	912
Solano	848	1,011	1,562
Sonoma	1,913	2,535	3,489
Stanislaus	1,791	2,486	3,637
Sutter	333	445	643
Tehama	428	556	817
Trinity	30	48	77
Tulare	2,412	3,125	4,946
Tuolumne	248	360	553
Ventura	1,410	1,797	2,540
Yolo	798	1,045	1,643
Yuba	324	421	682
Outside	---------	---------	112
Totals	123,516	163,795	232,440

TABLE XXXIX.

State Motor Vehicle Department of California.

Comparative statement of number of motorcycle and chauffeur registrations by counties for the years 1914, 1915 and 1916.

County	Motorcycles			Chauffeurs		
	1914	1915	1916	1914	1915	1916
Alameda	1,912	1,962	2,279	972	1,297	718
Alpine	----------	1	----------	----------	----------	----------
Amador	21	24	28	23	17	21
Butte	229	241	285	110	57	87
Calaveras	26	25	28	15	9	22
Colusa	63	60	94	47	33	57
Contra Costa	279	300	411	86	79	88
Del Norte	9	12	8	7	3	9
El Dorado	18	25	20	23	15	18
Fresno	1,342	1,405	1,611	371	165	275
Glenn	249	76	97	46	23	23
Humboldt	279	296	314	262	215	281
Imperial	111	116	149	154	79	150
Inyo	16	15	6	26	11	7
Kern	538	599	685	340	267	332
Kings	150	147	150	52	16	24
Lake	30	28	24	35	38	39
Lassen	12	24	21	10	7	18
Los Angeles	7,685	8,088	9,724	8,437	7,544	4,617
Madera	87	105	117	43	17	47
Marin	116	115	131	87	112	116
Mariposa	4	5	4	12	19	42
Mendocino	31	42	59	71	45	39
Merced	118	151	200	66	40	39
Modoc	6	13	20	25	16	21
Mono	----------	----------	----------	3	1	1
Monterey	148	158	231	138	119	119
Napa	158	155	171	103	84	100
Nevada	37	37	43	31	23	19
Orange	801	932	1,092	275	239	194
Placer	84	98	99	63	45	71
Plumas	7	9	14	17	22	15
Riverside	760	832	832	160	111	160
Sacramento	927	938	950	413	688	517
San Benito	56	73	101	42	37	44
San Bernardino	977	1,051	1,307	365	192	285
San Diego	1,009	1,069	1,180	1,078	1,083	761
San Francisco	1,658	1,750	2,159	2,476	5,931	3,341
San Joaquin	733	847	988	244	223	195
San Luis Obispo	120	127	137	107	101	138
San Mateo	200	231	337	231	281	170
Santa Barbara	304	320	388	264	218	360
Santa Clara	1,154	1,248	1,473	378	292	291
Santa Cruz	211	218	229	94	54	69
Shasta	53	51	68	37	15	16
Sierra	7	2	5	22	8	9
Siskiyou	37	42	58	39	39	45
Solano	200	219	236	162	74	117
Sonoma	345	363	411	233	134	159
Stanislaus	397	468	528	91	86	90
Sutter	57	62	73	27	17	18
Tehama	125	138	150	41	29	28
Trinity	2	1	3	8	8	11
Tulare	558	563	736	185	65	97
Tuolumne	18	26	23	32	29	29
Ventura	186	190	213	93	73	72
Yolo	172	154	207	70	44	49
Yuba	43	63	79	67	48	48
Outside	----------	----------	8	----------	----------	2
Totals	24,709	26,401	30,994	18,881	20,848	14,730

TABLE XL.

Motor Vehicle Receipts by Counties from January 1 to December 31, 1916.

Statement of gross and net receipts, operating and administration expenses and total apportionment to counties for the year ending December 31, 1916.

County	Gross receipts	Net receipts	Pro rata of expenses	County share
Alameda	$153,480 30	$148,761 05	$12,961 20	$67,899 92
Alpine	104 54	104 54	9 09	47 73
Amador	3,600 05	3,557 65	310 90	1,623 37
Butte	17,987 43	17,679 73	1,592 66	8,043 54
Calaveras	3,363 75	3,296 35	296 20	1,500 07
Colusa	7,378 35	7,248 70	649 03	3,299 84
Contra Costa	18,682 87	18,434 47	1,663 08	8,385 69
Del Norte	1,196 33	1,188 73	104 41	542 17
El Dorado	2,952 72	2,940 52	272 14	1,334 18
Fresno	82,908 93	81,018 63	7,312 74	36,852 95
Glenn	7,545 42	7,464 92	661 45	3,401 74
Humboldt	16,995 33	16,705 63	1,472 39	7,616 61
Imperial	24,986 70	24,392 80	2,266 55	11,063 13
Inyo	3,746 64	3,725 44	353 91	1,685 76
Kern	50,428 18	50,043 53	4,510 27	22,766 63
Kings	14,947 73	14,771 83	1,322 81	6,724 76
Lake	2,818 86	2,758 36	243 09	1,257 64
Lassen	2,881 51	2,834 71	262 41	1,286 15
Los Angeles	720,988 71	688,737 16	60,744 66	313,996 25
Madera	6,267 25	6,139 85	568 89	2,785 48
Marin	11,508 09	11,248 04	977 97	5,135 03
Mariposa	1,379 46	1,372 06	129 43	621 32
Mendocino	8,558 30	8,323 10	725 77	3,798 67
Merced	12,293 56	12,127 61	1,087 57	5,520 02
Modoc	3,045 99	3,031 74	281 71	1,375 01
Mono	213 75	213 75	24 66	94 55
Monterey	16,311 65	15,881 95	1,411 13	7,235 40
Napa	10,746 47	10,510 17	899 33	4,805 43
Nevada	4,117 53	4,078 38	367 35	1,855 51
Orange	60,620 02	58,697 47	5,067 99	26,814 74
Placer	8,339 21	8,119 11	737 94	3,690 59
Plumas	1,998 76	1,978 76	182 14	898 31
Riverside	35,942 90	35,017 00	3,093 00	15,961 99
Sacramento	60,002 69	56,338 44	4,796 99	25,770 73
San Benito	5,966 83	5,859 13	518 61	2,670 26
San Bernardino	58,032 69	56,484 39	4,943 10	25,770 65
San Diego	87,980 11	84,787 81	7,501 04	38,643 38
San Francisco	256,927 30	245,035 60	21,359 90	111,837 85
San Joaquin	51,685 24	50,491 79	4,520 80	22,985 49
San Luis Obispo	13,863 11	13,648 71	1,212 45	6,218 14
San Mateo	20,650 28	20,183 58	1,775 13	9,204 22
Santa Barbara	36,144 61	35,057 51	3,116 72	15,970 40
Santa Clara	71,036 65	69,429 00	6,074 10	31,677 45
Santa Cruz	15,513 43	15,126 63	1,304 23	6,911 20
Shasta	5,262 62	5,192 42	478 48	2,356 97
Sierra	881 67	881 67	86 07	397 80
Siskiyou	7,538 07	7,444 27	667 18	3,388 54
Solano	14,021 78	13,769 13	1,224 44	6,272 35
Sonoma	32,158 16	31,661 76	2,731 19	14,465 29
Stanislaus	33,150 77	32,154 37	2,923 94	14,615 21
Sutter	5,429 36	5,384 71	493 22	2,445 74
Tehama	7,005 31	6,888 91	622 56	3,133 18
Trinity	727 27	722 47	67 01	327 73
Tulare	41,247 60	40,441 95	3,675 71	18,383 12
Tuolumne	4,837 27	4,799 47	435 57	2,181 95
Ventura	23,644 23	21,925 08	1,943 21	9,990 93
Yolo	14,473 60	14,200 80	1,286 39	6,457 21
Yuba	6,211 12	6,129 77	552 39	2,788 69
Outside	219 00			
Totals	$2,192,943 06	$2,116,443 11	$186,873 80	$964,784 66

Statement of Receipts.

(Disbursements and Settlements Year Ending December 31, 1916.)

	June 30	December 31	Total, year	
Automobiles	$1,852,629 39	$161,544 15	$2,014,173 54	
Motorcycles	48,211 00	4,299 50	52,510 50	
Chauffeurs	18,588 00	3,749 50	22,337 50	
Auto dealers	33,141 25	3,087 75	36,229 00	
Motorcycle dealers	947 50	15 00	962 50	
Substitutions	39,913 25	26,572 95	66,486 20	
Miscellaneous	71 32	20 07	91 39	
Gross receipts 6 months, June 30	$1,993,501 71			
Gross receipts 6 months, December 31		$199,288 92		
Total receipts year, December 31, 1916			$2,192,790 63	$2,192,790 63
Deduct miscellaneous not apportioned				20 07
				$2,192,770 56
Refunds, Chapter 188, 1915	$48,972 95	$17,739 20	$66,712 15	
Refunds, Chapter 357, 1915	6,486 55	3,128 75	9,615 30	
Total refunds	$55,459 50	$20,867 95	$76,327 45	76,327 45
Net receipts	$1,938,042 21	$178,400 90		$2,116,443 11
Expenses (including plates)	150,894 54	35,979 26		188,873 80
Total apportionments	$1,787,147 67	$142,421 64		$1,929,569 31
One-half, state's share	$893,573 84	$71,210 82		$934,784 66
One-half, counties' share	893,573 83	71,210 82		964,784 65
Average monthly receipts, net	$323,021 10	$29,733 50	$176,370 26	
Average fee for automobile	$9.77	$4.005	$8.666	
Average fee for automobile, 1915	12.424	6.533	11.524	

PART XII.

CALIFORNIA FISHERIES IN 1909 AND 1915-16.*

California Fisheries: Quantity and Value of Salmon; Salmon Rivers; Salmon Catch by Counties; Monterey Sardines; California Oysters; Catch of Fish in 1915; Canned Fish in 1915. Statistics for 1916.

The principal feature in the California fisheries is a decline in value of products since the year 1904. Although the quantity is greater, fewer men are employed and more motive power in boats.

The quantity of fish, oysters, and whale products caught in 1908 was 645,000 pounds more than in 1899, but the value was $581,000 less. Cod showed a decline, as did flounders, smelt, sole, and crags. Oysters fell from $867,000 in 1899 to $337,000 in 1908. Salmon showed an increase, the catch amounting to 24 per cent of the total value of the products in 1908, compared with 10 per cent in 1899. Other species that have increased notably are striped bass, barracuda, spiny lobsters, rockfish, catfish, and white sea bass.

The value of the products taken in the shore and boat fisheries in 1908 was $1,627,000, 38 per cent of which was obtained in the Sacramento River, where salmon was the principal species caught, amounting to 7,292,000 pounds. San Francisco Bay was second in rank, according to the value of products taken in the shore and boat fisheries. Herring was the principal species taken in the bay fisheries, while oysters, smelt, sea bass, rockfish, striped bass, and sardines were also taken in considerable quantities.

The vessel fisheries were credited with products valued at $343,000, whalebone and whale oil accounting for $132,000, but the vessel fisheries amounted to only 17 per cent of the total value of the fishery products of the state.

In 1908 salmon stood first, both in quantity and in value, among the species of fish taken in California waters, the state ranking third in the country, both in quantity and in value of the catch of salmon. Of the total quantity, 79 per cent was taken from the Sacramento River. Striped bass ranked second and cod third in value, the latter being taken largely off the coast of Alaska. All were salted, and the catch was 41 per cent less than in 1904.

SUMMARY OF QUANTITIES AND VALUES.

In the value of products from fisheries, California ranked second among the Pacific coast states, both at the canvass of 1904 and 1908. The river or inland fisheries are confined almost exclusively to the rivers flowing into San Francisco Bay, the largest and most productive of which is the Sacramento.

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*For further details regarding California Fisheries, see Report for 1913, pages 220-225.

The following tabular statement gives a summary of the industry for 1908.

Number of persons employed	4,129
Vessels and boats, including outfit	$1,066,000
Apparatus of capture	$502,000
Shore and accessory property and cash	$91,000
Value of products	$1,970,000

The estimated value of fishing boats and gear in 1915 was as follows:

For boats	$730,400
Investment in fishing gear	195,800
Total	$926,200

The quantity and value of fish taken by the shore and boat fisheries from the different waters of the state in 1908 was as follows:

Fishing ground	Quantity, pounds	Value
Sacramento River	11,643,000	$617,000
San Francisco Bay	3,522,000	431,000
Pacific Ocean	8,552,000	249,000
Humboldt Bay, including Eel and Mad rivers	2,888,000	96,000
Monterey Bay	5,248,000	89,000
Monica Bay	2,574,000	67,000
Santa Barbara Channel	1,535,000	62,000
Klamath River	433,000	8,900
San Luis Obispo Bay	464,000	6,200
Totals	36,859,000	$1,626,100

Varieties of Fish Caught in 1908.

Variety	Pounds	Value
Salmon	9,211,000	$471,000
Chinook	8,846,000	460,000
Blueback	147,000	4,900
Silver	141,000	4,200
Steelhead	76,000	2,800
Sardines	4,638,000	30,000
Sole	3,487,000	65,000
Cod (salted)	3,298,000	94,000
Barracuda	3,205,000	88,000
Flounders	3,193,000	80,000
Rockfish	2,319,000	60,000
Striped bass	1,776,000	135,000
White sea bass	1,337,000	42,000
Catfish	1,069,000	56,000
Crabs	1,702,000	69,000
Oysters	729,000	337,000
Abalone (meat and shells)	1,235,000	22,000

Crustaceans.

Crabs are taken in Monterey Bay, along the coast from Half Moon Bay to Bodega Bay, and along the coast of Humboldt County. The spiny lobster fisheries are located along the coast of southern California from the northern boundary line of Santa Barbara County south to Mexico, including the adjacent islands. Practically all the shrimps are taken in San Francisco. Ecrevisse are taken in the rivers of Sonoma County.

Mollusks.

San Luis Obispo County furnishes most of the Pismo clams, although considerable quantities are taken on the beaches of Monterey Bay.

The soft shell clams are taken principally in San Francisco Bay and in Tomales Bay, Marin County.

The small quantity of cuttle fish used are taken by Monterey, Santa Cruz, and San Francisco fishermen.

The squid, which are consumed mostly by the Chinese and Japanese, are taken in the vicinity of Monterey Bay. The abalones, while found generally along the rocky sections of the coast, are taken for marketing and canning purposes principally in San Luis Obispo, Monterey, and Santa Cruz counties. Abalones are fairly abundant in several other places along the coast, as for instance Sonoma and Mendocino counties, and there are quite a few shipped from these counties to the San Francisco and Oakland markets.

The large California mussels are taken at various places along the rocky portions of the coast, but are not handled to any great extent by the markets. A smaller variety found in San Francisco Bay is sold in the San Francisco and Oakland markets to some extent.

THE SALMON FISHERIES.

The largest, best-known, and most valuable species is the Chinook, or King salmon, which is found from Ventura River to North Sound, Alaska. There are two runs of spawning fish in the Sacramento, the ''spring run,'' in April, May, and June, spawning mainly in the cold water of the McCloud and Fall rivers. The second, or ''fall run,'' occurs in August, September, and October, and these fish spawn in the riffles in the main river, between Tehama and Redding.

In former years the San Joaquin, and the American and Feather rivers of the Sacramento system, had large runs of salmon, but excessive fishing and the operation of various mining and irrigation projects have practically depleted them.

The Eel and Mad rivers of northern California have only a fall run, while the Klamath River has both a spring and a fall run, and the Smith River, in the northern part of the state, has a spring run alone.

The salmon rivers and fishing grounds in California are: Smith River, Klamath River, Humboldt Bay and tributaries, Mad River, Eel River, Mattole River, a small river in the southern part of Humboldt County, Sacramento and San Joaquin rivers, Pit and McCloud rivers, and Battle Creek.

The principal fishing grounds for salmon are Suisun Bay and the lower part of the San Joaquin and Sacramento rivers. Drift gill nets are used almost exclusively. From Sacramento to Anderson there is considerable commercial fishing with haul seines. The southernmost point on the coast where salmon are taken commercially is Monterey Bay.

Persons Employed. The total number of persons employed in the salmon fisheries in 1909 was 2,675, Contra Costa County leading with 774 persons. These are classified as follows:

	Fishermen	Shoremen	Transporters
White	2,114	276	----------
Japanese	168	5	----------
Chinese	15	----------	----------
Indians	----------	15	----------
Totals	2,297	296	82

The total catch in 1909 amounted to 12,141,937 pounds, valued at $585,995. Contra Costa leads in catch, followed closely by Solano County. Nearly four-fifths of the catch were made will gill nets, while Chinook salmon comprise almost all of the catch.

Production and Value by Species.

Species	Pounds	Value
Blueback	21,000	$689
Chinook (fresh)	11,893,199	575,542
Chinook (salted)	69,049	4,552
Silver (fresh)	99,500	2,675
Silver (salted)	46,000	1,900
Dog	4,200	84
Steelhead trout	8,989	553
Totals	12,141,937	$585,995

Production and Value of Salmon Catch by Counties in 1909.

County	Pounds	Value
Del Norte	655,225	$12,852
Humboldt	864,198	34,124
Marin	5,330	310
San Francisco	91,063	4,055
Solano	3,238,788	168,713
Contra Costa	3,949,080	211,166
San Joaquin	61,187	2,585
Yolo	197,520	10,852
Sacramento	599,723	32,690
Sutter	62,119	1,917
Butte	163,022	8,285
Glenn	72,547	3,627
Tehama	314,102	16,905
Shasta	46,475	2,789
Monterey*	1,779,524	73,134
Santa Cruz*	41,984	1,991
Totals	12,141,937	$585,995

*With lines.

Statistics by Waters in 1909.

Persons Employed. Of the 2,675 persons employed in the industry, 1,880 were on Sacramento River; the next largest was employed on Monterey Bay.

Waters	Fishermen	Shoremen	Transporters	Total
Smith River	47	32		79
Klamath River	37		3	40
Mad River	41			41
Humboldt Bay	7	6		13
Eel River	291	13		304
Sacramento River	1,582	219	79	1,880
Monterey Bay	292	26		318
Totals	2,297	296	82	2,675

Products and Value of the Salmon Catch by Waters.

Waters	Pounds	Value
Smith River	94,000	$3,200
Klamath River	561,225	9,652
Mad River	108,900	4,286
Humboldt Bay	28,000	840
Eel River	727,298	28,998
Sacramento River	8,801,006	463,894
Monterey Bay	1,821,508	75,125
Totals	12,141,937	$585,995

Canned and Cured Salmon.

Mild, Cured, and Smoked Salmon in 1909.

Waters	Mild cured Chinook		Smoked				Total	
			Chinook		Silver			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eel	64,000	$6,400	50,000	$5,000	3,000	$300	117,000	$11,700
Sacramento	4,095,162	450,019	56,550	8,943	4,660	326	4,156,372	459,288
Monterey Bay	728,800	64,049	4,000	700			732,800	64,749
Totals	4,887,962	$520,468	110,550	$14,643	7,660	$626	5,006,172	$535,737

The output of mild cured and smoked salmon in 1915 was 3,187 tierces, compared with 2,650 tierces in 1914.

Sacramento Canned Salmon.

The quantity of canned salmon from the Sacramento River since 1873 increased rapidly the first ten years, until it touched upwards of 200,000 cans in 1882; since that year the quantity packed varied greatly, and rapidly declined until 1905, only 2,780 cases were canned, as the cost of the fish was so high that it did not pay. During the last five years there appears to have been a revival in the industry, although it varies considerably. The number of cases reported being: 1911, 4,142; 1912 (not reported); 1913, 950; 1914, 17,315; 1915, 6,179.

Codfish Catch, 1913-1914.

The codfish catch of the San Francisco fishing fleet in 1913 amounted to 1,639,847 fish; in 1914 to 2,439,202; in 1915 to 2,482,900, and in 1916 to 2,126,000 fish.

The total number of men employed in 1915 was 372, of whom 255 were employed on fishing vessels, 22 in transportation, and 95 in shore work.

Sardine Fishery.

A regular sardine fishery exists in Monterey Bay, where large quantities are caught and packed. In 1913 the quantity packed at Monterey amounted to 70,000 cases, and in 1914 to 80,000 cases, and in 1915 the catch was very poor, amounting only to 47,500 cases, but in 1916 it amounted to 260,000 cases.

Pack of Tunny Fish.

The pack of tunny fish, which was only commenced a few years ago, shows a steady increase, the output being:

Year	Cases
1911	42,000
1912	90,000
1913	115,000
1914	325,000
1915	348,000
1916	367,000

Long Beach, San Pedro and San Diego now have large canneries for this fish. The season lasts from about the end of July to the latter part of November.

Abalones.

More than two-thirds of the catch in this state comes from Monterey Bay.

California Oysters Produced.

The production of oysters varies considerably. The figures are not available for every year but the following summary will give some idea of the size and value of the industry:

Year	Bushels	Value
1890	151,325	$592,137
1895	163,636	539,497
1899	420,000	867,000
1904	188,613	628,023
1908	104,000	337,000
1912	68,037	280,344

In California the oyster industry, including the cultivation of oysters and the oyster trade, centers in San Francisco, and the oyster grounds are located chiefly in San Francisco Bay, although there are oyster grounds also in Tomales and Humboldt bays. The oyster product of the state is all obtained from private grounds, and the season extends practically through the entire year. Of the 68,000 bushels produced in 1913 all, except 600 bushels of native oysters, valued at $1,800, were

Eastern oysters, grown from seed oysters brought from the Atlantic coast and planted on the local beds.

Estimated Catch of Fish in 1915.*

Fish, Mollusks and Crustaceans Taken in California, 1915.

	Pounds
Abalone (in shell)	1,250,000
Albacore	30,000,000
Anchovy	1,250,000
Barracuda	3,500,000
Bonito	200,000
Catfish	750,000
Carp	125,000
Croaker	121,400
Cultus cod	800,000
Dogfish	3,000
Flounders, soles and sand dabs	9,000,000
Hake	250,000
Hardhead and pike	75,000
Herring	1,450,000
Halibut (California)	7,500,000
Kingfish	600,000
Mackerel	850,000
Mullet	13,000
Perch	208,000
Pompano	35,000
Rock bass	400,000
Rock fish (rockcod, chili peppers, bocaccio, etc.)	5,500,000
Sardines	7,500,000
Salmon	7,000,000
Sea bass (white)	1,250,000
Sculpin	10,000
Sea bass (black)	75,000
Shad	4,500,000
Skates	150,000
Smelts	1,500,000
Striped bass	1,575,000
Sturgeon	5,000
Tom cod	30,000
Trout (lake)	75,000
Trout (steelhead)	35,000
Whitebait	25,000
Yellowtail	1,750,000
Clams (miscellaneous)	850,000
Crabs, dozen	65,000
Oysters (in shell), number	12,000,000
Mussels	150,000
Shrimps	300,000
Spiny lobsters	650,000
Squid and devilfish	1,500,000

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*See Report of the State Fish and Game Commission, 1915.

Number of Cases of Fish Canned in California in 1915.

Kind	1-pound cans*	½-pound cans	¼-pound cans
Tuna	136,046	172,263	51,977
Sardines	45,578	609	
Salmon	17,143	8,230	
Abalone	4,780	4,284	
Bonito	117	5,477	
Yellowtail	465	1,969	36
Shad	5,000		
Shad roe	4,800		
Rockcod	12	817	

*48 cans to the case.

THE FISHING INDUSTRY IN CALIFORNIA IN 1916.

For the year 1916 the wholesale fish dealers, packers and canners of California reported the receipt of 110,000,000 pounds of fish received from fishermen and fish taken by themselves. At an average price to the fishermen of four cents per pound, which we believe is a conservative average price, this would represent a value of $4,400,000. There were 3,820 fishermen employed in catching fish, and the fishing boats used in the state were as follows: Boats transporting and collecting fish from fishermen, 59 (all under 15 tons); fishing boats under 5 tons, 1,917; fishing boats over 5 tons and under 15 tons, 146; fishing boats over 15 tons and under 50 tons, 15, making a total of 2,137 boats and representing an investment of $2,445,710. The number of nets used by fishermen, including all kinds, was 8,275, representing an investment of $620,729.

During the year there were along the California coast and the inland waters, 101 fishery plants operated by wholesale dealers, packers and canners who either caught their own fish or received fish direct from fishermen (dealers who received fish from wholesalers not included in this report); 71 of these plants were operated by wholesale dealers, who furnish the trade with fresh fish, and 30 of the plants were canning and packing establishments where fish were canned, pickled, cured, salted, smoked or dried. There was invested in these plants $2,008,004, of which $1,348,647 was invested by the canners and packers and $695,357 was invested by the wholesale fresh fish dealers. There were employed in these plants, not counting the fishermen, 3,967 people. There were three independent reduction plants operated in the state—that is plants not operated in conjunction with canneries or packing plants. These plants represented an investment of $107,000 and employed 62 people throughout the year.

Fish Canned.

The canned fish pack for 1916 was as follows: Tuna (albacore), 108,312 cases 1-pound cans, 299,935 cases $\frac{1}{2}$-pound cans, 54,113 cases $\frac{1}{4}$-pound cans; deviled or potted tuna, 3,430 cases $\frac{1}{2}$-pound cans, 14,679 cases $\frac{1}{4}$-pound cans; tuna chowder, 1,000 cases (No. 1 Eastern oyster); sardines, 168,502 cases 1-pound cans, 50,272 cases $\frac{1}{2}$-pound cans, 13,445 cases $\frac{1}{4}$-pound cans; salmon, 18,720 cases 1-pound cans, 23,016 cases $\frac{1}{2}$-pound cans; shad, 27,167 cases 1-pound cans; shad roe, 7,244 cases $\frac{1}{2}$-pound cans; bonito, 155 cases 1-pound cans, 5,169 cases $\frac{1}{2}$-pound cans, 930 cases $\frac{1}{4}$-pound cans; yellowtail, 11 cases 1-pound cans, 810 cases $\frac{1}{2}$-pound cans; mackerel, 133 cases 1-pound cans, 3,035 cases $\frac{1}{4}$-pound cans; herring, 7,223 cases 1-pound cans; anchovies, 201 cases $\frac{1}{4}$-pound cans; sea bass, 62 cases $\frac{1}{2}$-pound cans; miscellaneous fishery products, 1,182 cases $\frac{1}{2}$-pound cans, 856 cases $\frac{1}{4}$-pound cans; abalone, 5,889 cases 1-pound cans.

Fish Salted, Smoked, Pickled and Cured (Net weight).

Salmon, mild cured, 2,024,584 pounds; hard salted, 4,600 pounds; anchovies, pickled, 625,600 pounds; shad, mild cured, 241,080 pounds; sardines, salted, 244,600 pounds; herring, pickled and cured, 188,200 pounds; tuna, salted, 19,000 pounds; tuna, smoked, 27,414 pounds; tuna, cured in oil, 2,000 pounds; tuna, frozen, 65,205 pounds; rock fish, salted, 18,845 pounds; barracuda, salted, 12,000 pounds; rock bass, salted, 3,000 pounds; sea bass, salted, 5,000 pounds; Spanish mackerel, salted, 19,000 pounds; yellowtail, salted, 8,000 pounds; bonito, salted, 1,000 pounds; miscellaneous fish, salted, 223,396 pounds.

Chicken Food, Fish Scrap, Fish Oil, Etc.

Fish oil, 32,082 gallons; fish scrap, chicken food and fertilizer, 4,494,136 pounds.

Value of cannery buildings, and equipment, exclusive of boats and nets, $855,000.

Number of people employed in canneries during 1915 season, 1,950.

Fish Licenses. Anglers' licenses for the year ending December 31, 1915, amounted to $89,620; and market fishing licenses for the year ending March 31, 1916, $38,310.*

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*See Report of the State Fish and Game Commission, 1916.

CALIFORNIA GAME.*

Deer; Antelope; Mountain Sheep; Bear; Wild Ducks and Geese; Quail; Grouse; Sage Hen; Doves and Pigeons; Pheasants and Wild Turkeys.

The game animals are so valuable in California that the title to them has been retained by the state, and the fees charged for licenses, which expire annually on June 30, amount to a considerable sum.

The rates are: Residents, $1; nonresidents, $10, and aliens, $25.

The receipts in the last four years have been: 1910-11, $143,265; 1911-12, $146,181; 1912-13, $115,984; 1913-14, $164,111, and in 1914-15, $166,307.

Fish and Game Districts.

In California there are so many different conditions of climate and topography that it is almost impossible to create a blanket fish and game law. When deer, for example, are in proper condition to be killed in one section they are out of condition in another. The legislature in 1915 divided the state into twenty-nine fish and game districts.

Deer. It is reported in many parts of the state that deer are on the increase, but this is doubtful. There are probably killed in the state each year by hunters, 10,000 deer. It has been estimated that every mountain lion will kill at least 52 deer a year; estimating the lions at 250, the number devoured by them would amount to 13,000. Coyotes and other animals would probably bring the total number destroyed to near 30,000. In average years the natural death rate is not great; most of them meet violent deaths, so the above number can be accepted as the number of deer dead from all causes in the state. The total number killed in 1911 was 6,489; in 1912, 7,537, and in 1913, 8,269.

Elk and Antelope. Of the thousands of these animals that formerly ranged the state, there are now but a few scattered bands. In the San Joaquin Valley, near Buttonwillow, and in the Sequoia National Park range are all that are left of the thousands of "tule," a dwarf elk that formerly were found throughout the San Joaquin and Sacramento valleys. This species is peculiar to California, and now only number between 400 and 500 head.

Another variety is found in small numbers in Humboldt and Del Norte counties, in bands numbering from six to twelve, but the total number probably does not exceed 200.

The Antelope. The antelope is still found in the extreme eastern part of the state; some are found in Antelope Valley, in the northeastern part of Los Angeles County, while in the western San Joaquin Valley the largest band of the state is found. In Modoc, Lassen, and Siskiyou counties there are several small bands. All told, there are probably about 600 antelope left in the state.

Mountain Sheep. These still flourish in considerable numbers in the southeastern part of the state. Formerly this magnificent game animal ranged over the entire Sierra Nevada region and across to the lower Coast Range, as far north as San Luis Obispo County, but they are now restricted to the most inaccessible portions.

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*See Report of the California Fish and Game Commission, 1910-12 and 1912-14.

Bear. The grizzly bear is practically extinct. The common brown or black bear is fairly abundant in some parts. It is for the most part a harmless species, feeding on roots, berries, grubs and insects, and rarely kills sheep or hogs. The pelt of a well-colored bear in prime condition is worth from $20 to $40.

Fur-bearing Animals. Few people realize the importance of fur-bearing animals in this state, yet each year furs worth nearly $200,000 are shipped to the various fur centers.

Wild Ducks and Geese. These are the most abundant game birds in the state, although neither of them are nearly as numerous as they were in former years. Ducks breed throughout the entire state, and the number killed in California in 1911 is estimated at approximately one million.

Quail. Quail are slowly decreasing throughout most of the state, on account of the great number of hunters. In parts of the state there is urgent need of a close season for a number of years if quail are to be kept from extermination. Mountain quail have become very scarce throughout the southern end of the state, and in the coast region below San Francisco. In other parts of the state they are about holding their own.

Grouse. Ruffed grouse are fairly abundant in the extreme northwestern corner of the state. The blue grouse is becoming scarcer, and where the settlers have engaged in sheep raising, they are almost extinct.

The Sage Hen. This bird is found only in the eastern part of the state, in the true sagebrush country. The sage hen is practically never found below an elevation of 3,000 to 4,000 feet, nor out of the true sagebrush country. It is the largest California game bird.

Doves and Pigeons. The most difficult bird to arrange a proper season for is the common mourning dove, January being the only month in which they do not nest. On this account many sportsmen advocate the removal of the dove from the list of game birds. There is urgent need for the protection of the wild (band-tail) pigeon. This is the slowest breeding game bird in the United States. One egg is the complete set, and probably only one egg is laid the entire year.

Pheasants and Wild Turkeys and Hungarian Partridges. Of the introduced game birds, ring-neck pheasants have done well, especially in Humboldt County; they have also increased in parts of Santa Clara and San Joaquin valleys. Wild turkeys have been liberated in the lower Sierra Nevada region; other plants have been made in San Diego San Bernardino, Monterey, San Benito, Alameda, Sonoma, and Humboldt counties. Hungarian partridges have been given a good trial, but, as yet, without success.

PART XIII.

FINANCE AND TAXATION.

Tariff Acts 1789-1913; Imports and Exports of Gold and Silver 1890-1916; Foreign Trade and California Ports 1890-1916; Total Assessed Value by Counties 1910-1916. Assessed Value of All Property, 1850-1916. California Bank Clearings. Insurance: Fire, Life, and Marine.*

TARIFF ACTS.

Tariff Acts Passed by Congress.

(From 1789 to 1913.)

1789. July 4.
1790. August 10.
1791. March 3.
1792. May 2.
1794. June 7.
1795. January 29.
1797. March 3.
1800. May 13.
1804. March 27.
1816. April 27.
1818. April 20.
1824. May 22.
1828. May 19.
1832. July 14.
1833. March 2.
1842. August 30.
1846. July 30.
1857. March 3.
1861. March 2.
1861. August 5.
1862. July 14.
1863. March 3.
1864. June 30.
1865. March 3.
1866. July 28.
1867. March 2.
1870. July 14.
1872. June 6.
1875. February 8.
1883. March 3.
1890. June 10.
1890. October 1 (McKinley bill).
1894. August 27 (Wilson bill).
1897. July 24 (Dingley bill).
1905. March 3 (Philippine tariff).
1909. August 5 (Paine-Aldrich bill).
1909. August 5 (Philippine tariff).
1913. October 3 (Wilson bill).

In addition to the above 38 acts, there are 224 other miscellaneous acts, proclamations, and joint resolutions, making a total of 262 on the subject of the tariff. The act which came into effect on October 4, 1913, makes a considerable reduction on agricultural products and places many articles on the free list.

FOREIGN TRADE AND CALIFORNIA IMPORTS AND EXPORTS.

Custom districts and ports.	*Sub-ports of entry.*
San Francisco	Oakland, Port Harford, Monterey.
Los Angeles	Santa Barbara, Redondo Beach and San Pedro.
San Diego	
Humboldt	Eureka.

In 1914 these subports of entry were consolidated into two districts, San Francisco for northern California, and southern California including Los Angeles and San Diego.

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*For detailed statistics regarding State and National Banks by Counties, Steam and Electric Railroads, see Report for 1912, pages 272-309.

TARIFF CHANGES, 1909 AND 1913.

Summary of Principal Agricultural Products.

Article	Act of August 5, 1909	Act of October 3, 1913
Agricultural implements and machines	15 per cent	Free
Apples, peaches, pears, quinces, cherries, plums	25¢ bushel	10¢ bushel
Apricots and peach kernels	4¢ pound	3¢ pound
Bananas	Free	No change
Beans and peas, prepared	2½¢ pound	1¢ pound
Beans	45¢ bushel	25¢ bushel
Beeswax	Free	No change
Beets	25 per cent	5 per cent
Beets (sugar)	10 per cent	5 per cent
Berries, in natural state	1¢ quart	½¢ quart
Brandy and other spirits	$2.60 proof gal.	No change
Casks, barrels, packing boxes	30 per cent	15 per cent
Champagne	$9.60 per dozen	No change
Cider	5¢ per gallon	2¢ per gallon
Cotton, raw	Free	No change
Cranberries	25 per cent	10 per cent
Currants, Greek	2¢ pound	1½¢ pound
Dates	1¢ pound	No change
Eggs (fresh)	Free	No change
Evaporated fruits	2¢ pound	1¢ pound
Figs	2½¢ pound	2¢ pound
Fruit plants, tropical	Free	No change
Grapes (in packages)	25¢ cubic foot	No change
Honey	20¢ gallon	10¢ gallon
Lemons	1½¢ pound	*
Oranges, limes, pomeloes	1¢ pound	*
Nursery stock	25 per cent	15 per cent
Nuts—		
Almonds, unshelled	6¢ pound	4¢ pound
Walnuts, shelled	4¢ pound	3¢ pound
Walnuts, unshelled	5¢ pound	4¢ pound
Filberts, shelled	3¢ pound	2¢ pound
Filberts, unshelled	5¢ pound	4¢ pound
Peanuts, shelled	3¢ pound	2¢ pound
Peanuts, unshelled	1¢ pound	¾¢ pound
All other nuts	1¢ pound	1¢ pound
All other nuts (from Philippine Islands)	1¢ pound	Free
Olives, in bottles, less than 5 gallons	25¢ gallon	15¢ gallon
Olives, in packages, over 5 gallons	15¢ gallon	
Olive oil in bottles, less than 5 gallons (edible)	50¢ gallon	30¢ gallon
Other olive oil	40¢ gallon	20¢ gallon
Olive oil fit only for mechanical or manufacturing purposes	Free	No change
Petroleum and mineral oils	Free	No change
Onions	40¢ bushel	20¢ bushel
Peas, green or dried	25¢ bushel	10¢ bushel
Pickles and sauces	40 per cent	25 per cent
Pineapples in barrels or packages	8¢ cubic foot	6¢ cubic foot
Pineapples preserved in own juice	25 per cent	20 per cent
Potatoes (from countries imposing duty on American potatoes)	25¢ bushel	10 per cent
Potatoes	25¢ bushel 60 lbs.	Free
Poultry, live	3¢	1¢
Poultry, dead	5¢	2¢
Prunes	2¢ pound	1¢ pound
Raisins and dried grapes	2½¢ pound	2¢ pound
Rice, cleaned	2¢ pound	1¢ pound
Rice, uncleaned	1¼¢ pound	⅝¢ pound
Sugar	Various rates	†
Sugar beets (see Beets).		
Vegetables, prepared or pickled	40 per cent	25 per cent
Vegetables, natural, not otherwise specified	25 per cent	15 per cent
Vinegar	7½¢ per proof gal.	4¢ per proof gal.
Wine and brandy	Various rates	No change

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*In packages, capacity 1¼ cubic feet, or less, 18¢ per package; exceeding 1¼ cubic feet and not exceeding 2½ cubic feet, 35¢ per package; exceeding 2½ cubic feet and not exceeding 5 cubic feet, 70¢ per package: exceeding that size or in bulk, ½ of 1¢ per pound.

†No change till March 1, 1914, when a reduction of about 12½ per cent took place. After May 1, 1916, sugar will be admitted free.

TARIFF CHANGES—Continued.

Farm Animals and Dairy Products.

Commodity	Before October 4, 1913	October 4, 1913, and after
Animals:		
Asses	Breeding purposes and teams of immigrants, free; all other, 20 per cent ad valorem.	Breeding purposes and teams of immigrants, free; all other, 10 per cent ad valorem.
Cattle	Breeding purposes and teams of immigrants, free; all other: less than 1 year, $2 per head; all other, worth not over $14, $3.75 per head; worth over $14, 27½ per cent ad valorem.	Free.
Goats	20 per cent ad valorem	Free.
Horses	Breeding purposes and teams of immigrants, free; all other: worth $150 or less per head, $30; worth over $150, 25 per cent ad valorem.	Breeding purposes and teams of immigrants, free; all other, 10 per cent ad valorem.
Mules	Same as horses	Same as horses.
Sheep	Breeding purposes, free; all other: less than 1 year old, 75 cents per head; 1 year old and over, $1.50.	Free.
Swine	Breeding purposes, free; all other, $1.50 per head	Free.
Dairy products:		
Butter	6 cents per pound	2½ cents per pound.
Cheese	6 cents per pound	20 per cent ad valorem.
Cream	5 cents per gallon	Free.
Milk	Fresh, 2 cents per gallon; condensed and evaporated, 2 cents per pound.	Free.
Hides and skins, raw	Free	Free.
Meat:		
Beef and veal	Fresh beef, 1½ cents per pound; other beef, 25 per cent ad valorem; veal, 1½ cents per pound,	Free.
Mutton and lamb	1½ cents per pound	Free.
Pork	Fresh, 1½ cents per pound; bacon and hams, 4 cents per pound; other pork, 25 per cent ad valorem.	Free.
Sausage	Bologna, or frankfurter, free; other sausage, 25 per cent ad valorem.	Free.
Wool	Class 1, clothing, etc., wools; unwashed, 11 cents per pound; washed, 22 cents; scoured, 33 cents. Class 2, combing, etc., wools, unwashed, 12 cents per pound; washed, 12 cents; scoured, 36 cents. Class 3: value not over 12 cents per pound, 12 cents; over 12 cents, 21 cents.	Free on and after Dec. 1, 1913

Cereals, Hay, Hops, and Straw.

Commodity	Before October 4, 1913	October 4, 1913, and after
Barley	30¢ per bushel of 48 pounds	15¢ per bushel.
Broom corn	$3 per ton	Free.
Buckwheat	15¢ per bushel of 48 pounds	Free.
Corn	15¢ per bushel of 56 pounds	Free.
Oats	15¢ per bushel of 32 pounds	6¢ per bushel.
Rye	10¢ per bushel	Free.
Wheat	25¢ per bushel	Free.
Wheat flour	25 per cent ad valorem	Free.
Hay	$4 per ton	$2 per ton.
Hops	16¢ per pound	No change.
Straw	$1.50 per ton	50¢ per ton.

Imports and Exports of Gold and Silver (Coin and Bullion) of California Ports, 1890-1916 for fiscal year ending June 30.

San Francisco.

Year	Gold		Silver		Gold and silver	
	Imports	Exports	Imports	Exports	Total imports	Total exports
1890	$4,751,582	$1,520,262	$3,269,267	$13,258,391	$8,020,849	$14,778,653
1891	6,358,074	1,646,118	3,634,455	5,609,371	9,992,529	7,255,489
1892	9,736,872	808,791	3,086,706	9,458,354	12,823,578	10,267,145
1893	5,508,193	1,110,013	2,661,819	13,870,229	8,170,012	14,980,242
1894	2,693,636	1,202,443	2,126,973	13,142,267	4,820,609	14,344,710
1895	1,858,878	708,298	1,971,768	13,344,012	3,830,646	14,052,310
1896	1,206,234	854,554	2,642,372	11,763,449	3,848,606	12,618,003
1897	9,647,628	1,083,945	2,611,694	9,459,133	12,259,322	10,543,078
1898	25,799,405	1,217,490	2,472,347	9,514,531	28,271,752	10,732,021
1899	32,124,013	1,774,717	2,551,666	4,889,974	34,675,679	6,664,691
1900	10,574,256	2,025,189	3,096,775	7,502,120	13,671,031	9,527,309
1901	24,911,109	364,758	3,738,814	7,927,900	28,649,923	8,292,658
1902	14,338,906	781,826	4,169,221	8,368,761	18,508,127	9,150,587
1903	9,263,674	3,114,023	2,679,547	6,392,414	11,943,221	9,506,437
1904	40,366,770	652,277	3,492,909	4,600,950	43,859,679	5,253,227
1905	15,590,871	5,905,700	3,003,796	6,622,002	18,594,667	12,527,702
1906	4,233,579	5,366,189	2,513,861	9,417,951	6,747,440	14,784,140
1907	14,504,917	22,391	3,414,584	2,410,717	17,919,501	2,433,108
1908	3,759,329	34,539	3,164,428	5,182,657	6,923,757	5,217,196
1909	3,588,424	3,033,975	2,652,954	6,886,849	6,241,378	9,920,824
1910	3,362,104	27,008,324	2,582,352	7,314,954	5,944,456	34,323,278
1911	8,111,108	20,690	1,579,109	9,262,759	9,690,217	9,283,449
1912	4,532,321	7,034,962	1,453,089	9,905,094	5,985,410	16,940,056
1913	3,941,975	113,108	1,808,461	11,753,927	5,750,436	11,867,035
1914	1,831,388	5,090	1,646,866	9,494,498	3,478,254	9,499,588
1915	25,881,230	68,855	2,150,838	6,021,927	28,032,068	6,090,782
1916	58,087,257	23,303,121	3,250,236	9,054,271	61,337,493	32,357,392

Imports of Gold and Silver into Southern California, 1914-1916.†

	Gold	Silver	Total gold and silver
1914	$22,009	$27,146	$49,155
1915	7,331	1,714	9,045
1916	10,189	6,260	16,449

Imports of Gold and Silver Into San Diego and Los Angeles, 1900-1913.

Year	Los Angeles			San Diego		
	Gold	Silver	Total gold and silver imports	Gold	Silver	Total gold and silver imports
1900	$50	----------	$50	$62,319	$948	$63,267
1901	----------	----------	----------	67,392	----------	67,392
1902	----------	----------	----------	46,690	948	47,638
1903	----------	$172	172	14,233	----------	14,233
1904	----------	25	25	16,774	418	17,192
1905	----------	----------	----------	32,565	----------	32,565
1906	----------	*172	*172	9,695	----------	9,695
1907	----------	----------	----------	4,915	996	5,911
1908	25	----------	25	10,553	997	11,550
1909	50	----------	50	29,066	----------	29,066
1910	----------	----------	----------	26,638	----------	26,638
1911	----------	----------	----------	11,481	----------	11,481
1912	6,000	----------	6,000	16,053	4,686	20,739
1913	----------	----------	----------	6,640	----------	6,640

NOTE.—The custom district of Los Angeles was established in 1888, and that of San Diego in 1879. No gold or silver is exported except through San Francisco.

*Also $1,000 in silver exported.

†Since 1914 the returns for Los Angeles and San Diego are combined under this heading. There are no exports of gold and silver from Southern California.

TARIFF CHANGES—Continued.

Farm Animals and Dairy Products.

Commodity	Before October 4, 1913	October 4, 1913, and after
Animals:		
Asses	Breeding purposes and teams of immigrants, free; all other, 20 per cent ad valorem.	Breeding purposes and teams of immigrants, free; all other, 10 per cent ad valorem.
Cattle	Breeding purposes and teams of immigrants, free; all other: less than 1 year, $2 per head; all other, worth not over $14, $3.75 per head; worth over $14, 27½ per cent ad valorem.	Free.
Goats	20 per cent ad valorem	Free.
Horses	Breeding purposes and teams of immigrants, free; all other: worth $150 or less per head, $30; worth over $150, 25 per cent ad valorem.	Breeding purposes and teams of immigrants, free; all other, 10 per cent ad valorem.
Mules	Same as horses	Same as horses.
Sheep	Breeding purposes, free; all other: less than 1 year old, 75 cents per head; 1 year old and over, $1.50.	Free.
Swine	Breeding purposes, free; all other, $1.50 per head	Free.
Dairy products:		
Butter	6 cents per pound	2½ cents per pound.
Cheese	6 cents per pound	20 per cent ad valorem.
Cream	5 cents per gallon	Free.
Milk	Fresh, 2 cents per gallon; condensed and evaporated, 2 cents per pound.	Free.
Hides and skins, raw	Free	Free.
Meat:		
Beef and veal	Fresh beef, 1½ cents per pound; other beef, 25 per cent ad valorem; veal, 1½ cents per pound,	Free.
Mutton and lamb	1½ cents per pound	Free.
Pork	Fresh, 1½ cents per pound; bacon and hams, 4 cents per pound; other pork, 25 per cent ad valorem.	Free.
Sausage	Bologna, or frankfurter, free; other sausage, 25 per cent ad valorem.	Free.
Wool	Class 1, clothing, etc., wools; unwashed, 11 cents per pound; washed, 22 cents; scoured, 33 cents. Class 2, combing, etc., wools, unwashed, 12 cents per pound; washed, 12 cents; scoured, 36 cents. Class 3: value not over 12 cents per pound, 12 cents; over 12 cents, 21 cents.	Free on and after Dec. 1, 1913

Cereals, Hay, Hops, and Straw.

Commodity	Before October 4, 1913	October 4, 1913, and after
Barley	30¢ per bushel of 48 pounds	15¢ per bushel.
Broom corn	$3 per ton	Free.
Buckwheat	15¢ per bushel of 48 pounds	Free.
Corn	15¢ per bushel of 56 pounds	Free.
Oats	15¢ per bushel of 32 pounds	6¢ per bushel.
Rye	10¢ per bushel	Free.
Wheat	25¢ per bushel	Free.
Wheat flour	25 per cent ad valorem	Free.
Hay	$4 per ton	$2 per ton.
Hops	16¢ per pound	No change.
Straw	$1.50 per ton	50¢ per ton.

Imports and Exports of Gold and Silver (Coin and Bullion) of California Ports, 1890-1916 for fiscal year ending June 30.

San Francisco.

Year	Gold		Silver		Gold and silver	
	Imports	Exports	Imports	Exports	Total imports	Total exports
1890	$4,751,582	$1,520,262	$3,269,267	$13,258,391	$8,020,849	$14,778,653
1891	6,358,074	1,646,118	3,634,455	5,609,371	9,992,529	7,255,489
1892	9,736,872	803,791	3,086,706	9,458,354	12,823,578	10,262,145
1893	5,508,193	1,110,013	2,661,819	13,870,229	8,170,012	14,980,242
1894	2,693,636	1,202,443	2,126,973	13,142,267	4,820,609	14,344,710
1895	1,858,878	708,293	1,971,768	13,344,012	3,830,646	14,052,305
1896	1,206,234	854,554	2,642,372	11,763,449	3,848,606	12,618,003
1897	9,647,628	1,083,945	2,611,694	9,459,133	12,259,322	10,543,078
1898	25,799,405	1,217,490	2,472,347	9,514,531	28,271,752	10,732,021
1899	32,124,013	1,774,717	2,551,666	4,889,974	34,675,679	6,664,691
1900	10,574,256	2,025,189	3,096,775	7,502,120	13,671,031	9,527,309
1901	24,911,109	364,758	3,738,814	7,927,900	28,649,923	8,292,658
1902	14,338,906	781,826	4,169,221	8,368,761	18,508,127	9,150,587
1903	9,263,674	3,114,023	2,679,547	6,392,414	11,943,221	9,506,437
1904	40,366,770	652,277	3,492,909	4,600,950	43,859,679	5,253,227
1905	15,590,871	5,905,700	3,003,796	6,622,002	18,594,667	12,527,702
1906	4,233,579	5,366,189	2,513,861	9,417,951	6,747,440	14,784,140
1907	14,504,917	22,391	3,414,584	2,410,717	17,919,501	2,433,108
1908	3,759,329	34,539	3,164,428	5,182,657	6,923,757	5,217,196
1909	3,588,424	3,033,975	2,652,954	6,886,849	6,241,378	9,920,824
1910	3,362,104	27,008,324	2,582,352	7,314,954	5,944,456	34,323,278
1911	8,111,108	20,690	1,579,109	9,262,759	9,690,217	9,283,449
1912	4,532,321	7,034,962	1,453,089	9,905,094	5,985,410	16,940,056
1913	3,941,975	113,108	1,808,461	11,753,927	5,750,436	11,867,035
1914	1,831,388	5,090	1,646,866	9,494,498	3,478,254	9,499,588
1915	25,881,230	68,855	2,150,838	6,021,927	28,032,068	6,090,782
1916	58,087,257	23,303,121	3,250,236	9,054,271	61,337,493	32,357,392

Imports of Gold and Silver into Southern California, 1914-1916.†

	Gold	Silver	Total gold and silver
1914	$22,009	$27,146	$49,155
1915	7,331	1,714	9,045
1916	10,189	6,260	16,449

Imports of Gold and Silver Into San Diego and Los Angeles, 1900-1913.

Year	Los Angeles			San Diego		
	Gold	Silver	Total gold and silver imports	Gold	Silver	Total gold and silver imports
1900	$50	------------	$50	$62,319	$948	$63,267
1901	------------	------------	------------	67,392	------------	67,392
1902	------------	------------	------------	46,690	948	47,638
1903	------------	$172	172	14,233	------------	14,233
1904	------------	25	25	16,774	418	17,192
1905	------------	------------	------------	32,565	------------	32,565
1906	------------	*172	*172	9,695	------------	9,695
1907	------------	------------	------------	4,915	996	5,911
1908	25	------------	25	10,553	997	11,550
1909	50	------------	50	29,066	------------	29,066
1910	------------	------------	------------	26,638	------------	26,638
1911	------------	------------	------------	11,481	------------	11,481
1912	6,000	------------	6,000	16,053	4,686	20,739
1913	------------	------------	------------	6,640	------------	6,640

NOTE.—The custom district of Los Angeles was established in 1883, and that of San Diego in 1879. No gold or silver is exported except through San Francisco.

*Also $1,000 in silver exported.

†Since 1914 the returns for Los Angeles and San Diego are combined under this heading. There are no exports of gold and silver from Southern California.

Imports and Exports of Foreign and Domestic Merchandise From California Ports, 1890-1916.*

(For fiscal year ending June 30.)

Year	San Francisco		Los Angeles	
	Imports	Exports	Imports	Exports
1890	$48,751,223	$36,876,091	$169,955	$220
1891	50,943,299	40,168,771	315,226	----------
1892	47,135,684	40,737,044	398,517	42,535
1893	45,291,099	31,144,180	502,044	----------
1894	38,146,626	24,903,009	445,966	102,943
1895	36,269,637	24,873,148	657,671	6,696
1896	41,400,317	31,582,910	679,944	30,487
1897	34,375,945	39,647,606	504,028	7,499
1898	42,822,945	41,223,759	476,042	110,440
1899	35,746,577	30,214,904	769,472	4,090
1900	47,869,628	40,368,288	1,011,090	----------
1901	35,161,753	34,596,792	885,473	30
1902	35,102,981	38,183,755	676,615	80
1903	36,454,283	33,502,616	1,019,481	682
1904	37,542,978	32,547,181	1,292,560	503
1905	46,675,545	49,924,026	810,000	291
1906	44,433,271	39,915,269	827,059	12,105
1907	54,094,570	33,026.664	1,559,322	45,000
1908	48,251,476	28,000,069	1,538,199	187,247
1909	49,998,111	31,669,370	1,305,341	193,221
1910	49,350,643	31,180,760	1,942,647	135,911
1911	53,885,021	40,624,903	2,655,558	86,415
1912	59.235,471	49,249,734	3,225,618	161,735
1913	62,501,681	66,021,385	2,747,601	253,562

NOTE.—The customs district of San Francisco was established September 28, 1850; that of San Diego in 1879; Los Angeles (Wilmington) and Humboldt in 1883.

*For the imports and exports, 1851-1879, see Report for 1912, pages 266-267.

Imports and Exports of Foreign and Domestic Merchandise From California Ports, 1890-1916—Continued.

(For Fiscal year ending June 30.

Year	San Diego		Humboldt		Totals*	
	Imports	Exports	Imports	Exports	Imports	Exports
1890	$437,665	$264,644	$1,549	$108,051	$49,360,392	$37,249,006
1891	538,066	394,824	4,005	154,503	51,800,596	40,718,098
1892	380,770	441,200	3,925	151,553	47,918,906	41,372,332
1893	407,236	79,443	1,571	138,008	46,201,950	31,361,631
1894	383,399	379,586	----------	106,750	38,975,991	25,492,288
1895	346,155	45,225	2,110	106,594	37,275,573	25,031,663
1896	324,465	196,419	1,460	102,440	42,406,186	31,912,256
1897	222,063	199,540	1,183	162,027	35,103,219	40,016,672
1898	198,417	491,139	1,181	146,725	43,498,645	41,972,063
1899	397,115	1,425,861	2,006	195,678	36,915,170	31,840,533
1900	559,585	2,739,174	1,528	253,616	49,441,831	43,361,078
1901	511,661	963,014	----------	163,682	36,558,887	35,723,518
1902	440,239	255,833	1,908	319,550	36,221,743	30,759,218
1903	417,557	168,993	3,423	497,810	37,894,744	34,170,101
1904	459,786	317,830	7,107	550,436	39,302,431	33,415,950
1905	275,631	320,533	1,821	140,441	47,762,997	50,385,291
1906	464,634	299,579	4,283	737,940	45,729,247	40,964,893
1907	653,789	809,809	1,173	677,092	56,308,854	34,558,565
1908	722,359	641,223	10,736	759,726	50,522,770	29,788,265
1909	535,257	397,626	4,862	894,228	51,843,571	33,154,445
1910	741,916	928,994	6,317	1,031,182	52,041,523	33,276,847
1911	875,184	1,022,481	6,779	1,058,615	57,422,542	42,792,414
1912	1,076,990	1,092,159	7,622	1,231,441	63,545,701	51,735,069
1913	1,022,904	1,137,116	8,330	1,028,046	66,280,516	68,440,109

On account of the reorganization of the customs districts since 1913, they having been consolidated into San Francisco for the northern ports, and southern California for the southern ports, the above detailed classification can not be continued.

*To these totals must be added the total imports and exports of gold and silver on page 287.

San Francisco and Southern California, 1914-1916.

(Merchandise.)

Year	San Francisco		Southern California		Total	
	Imports	Exports	Imports	Exports	Imports	Exports
1914	$67,111,081	$63,374,909	$4,908,543	$2,010,280	$72,019,624	$65,385,189
1915	76,068,028	81,500,979	4,716,390	2,512,355	80,784,418	84,013,334
1916	113,645,919	94,558,987	4,175,260	3,268,105	117,821,179	97,827,092

TABLE XLI.

Grand Total Value of All Assessed Property in California,* 1913-1916.

(From the Reports of the State Controller's Department.)

Counties	1913	1914	1915	1916
Alameda	$256,363,895	$252,751,974	$262,482,711	$262,615,761
Alpine	546,189	550,359	781,313	764,822
Amador	6,154,014	6,299,280	6,739,328	6,988,596
Butte	25,135,048	25,247,155	24,941,991	25,835,721
Calaveras	7,920,748	8,010,010	7,983,665	8,212,509
Colusa	15,485,375	15,662,550	16,036,728	16,242,337
Contra Costa	47,731,341	52,204,930	54,332,638	58,236,959
Del Norte	5,079,461	5,078,804	5,077,652	5,023,710
El Dorado	6,954,117	7,104,168	7,083,583	8,120,609
Fresno	92,261,816	96,567,818	96,803,387	99,632,587
Glenn	17,261,076	17,576,399	17,472,821	18,485,434
Humboldt	34,164,968	33,793,967	34,742,783	34,504,579
Imperial	21,554,632	25,757,829	29,121,521	30,744,665
Inyo	9,505,223	12,233,464	12,146,953	12,314,033
Kern	80,529,757	85,347,560	88,848,987	91,079,214
Kings	16,021,104	16,237,992	17,682,680	18,441,530
Lake	4,850,106	4,802,733	5,009,380	4,954,820
Lassen	8,338,937	9,336,777	10,385,369	10,578,528
Los Angeles	804,111,796	849,991,595	862,442,180	991,377,277
Madera	14,848,773	15,754,791	16,023,639	16,543,094
Marin	22,020,030	23,460,510	23,446,406	23,823,709
Mariposa	3,608,137	3,643,117	3,681,289	3,797,533
Mendocino	18,147,700	18,380,047	18,316,490	18,680,482
Merced	25,366,168	25,576,932	26,544,868	26,920,444
Modoc	7,709,392	7,972,273	8,068,490	8,154,866
Mono	1,946,359	1,831,331	1,911,797	2,760,745
Monterey	32,702,889	32,363,263	34,572,343	35,545,505
Napa	18,053,729	18,625,240	17,357,532	19,726,097
Nevada	8,060,030	8,226,968	8,347,631	8,547,227
Orange	48,185,593	54,546,951	55,266,628	57,403,590
Placer	12,973,772	12,710,488	14,947,936	13,689,090
Plumas	8,429,018	9,398,811	10,372,910	10,920,670
Riverside	31,984,516	34,005,577	35,189,142	36,567,385
Sacramento	91,000,053	93,464,057	96,406,835	96,573,956
San Benito	8,453,146	9,091,200	9,270,826	10,081,274
San Bernardino	60,176,743	63,345,022	66,239,493	67,958,129
San Diego	73,685,084	75,866,729	76,689,137	77,424,940
San Francisco	624,182,130	647,456,025	656,677,332	756,235,432
San Joaquin	65,557,627	66,368,964	68,421,947	70,383,447
San Luis Obispo	20,662,282	21,157,354	21,652,203	22,115,243
San Mateo	31,692,918	32,465,471	35,986,919	36,330,755
Santa Barbara	33,380,447	34,496,827	35,062,648	36,502,320
Santa Clara	80,072,624	81,008,331	86,666,646	87,250,360
Santa Cruz	20,903,743	21,135,033	20,837,458	20,825,863
Shasta	15,181,888	15,185,419	15,253,691	17,182,264
Sierra	2,428,636	2,395,222	2,516,471	2,444,026
Siskiyou	22,137,012	21,155,790	21,341,008	21,535,333
Solano	25,406,702	26,361,996	26,707,377	26,873,814
Sonoma	40,781,686	41,837,840	41,677,089	41,255,435
Stanislaus	31,158,943	31,843,486	33,193,980	33,731,883
Sutter	12,963,082	13,269,700	13,358,785	13,472,178
Tehama	15,644,158	15,779,193	16,039,723	15,896,977
Trinity	3,088,170	3,166,400	3,400,979	3,431,979
Tulare	46,842,975	48,840,387	52,682,367	53,324,733
Tuolumne	9,946,773	10,110,677	9,559,479	9,493,906
Ventura	30,834,087	30,971,620	32,159,977	32,642,867
Yolo	24,051,914	24,621,651	24,970,716	24,851,784
Yuba	9,898,108	10,200,095	10,510,887	10,687,852
Totals	$3,114,136,640	$3,232,646,152	$3,311,446,744	$3,577,877,764

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*For the figures for 1880 and 1890, see Report for 1912, pages 268-269.

TABLE XLII.

Funded Debt, Total County Indebtedness, and State and County Rate of Taxation Each $100 in 1915.

(From the Report of the State Controller.)

Counties	Funded debt	Floating debt with estimated interest	Total county indebtedness	General county rate of taxation on each $100 (no state rate)	
				Inside	Outside
Alameda	--------	$25,273 08	$25,273 08	$1.00	$1.40
Alpine	--------	6,696 66	6,696 66	--------	1.35
Amador	--------	--------	--------	1.60	2.00
Butte	--------	--------	--------	2.40	2.80
Calaveras	--------	--------	--------	1.65	2.05
Colusa	$350,000 00	--------	350,000 00	1.35	1.90
Contra Costa	161,000 00	--------	161,000 00	1.55	1.95
Del Norte	--------	2,388 00	2,388 00	1.30	1.90
El Dorado	120,000 00	--------	120,000 00	1.70	2.10
Fresno	--------	--------	--------	1.26	1.66
Glenn	450,000 00	--------	450,000 00	1.29	1.69
Humboldt	--------	--------	--------	1.86	2.40
Imperial	--------	--------	--------	1.48	2.05
Inyo	30,000 00	--------	30,000 00	1.30	1.60
Kern	2,451,000 00	--------	2,451,000 00	.85	1.20
Kings	655,000 00	--------	655,000 00	1.80	2.40
Lake	20,000 00	--------	20,000 00	1.59	2.09
Lassen	100,000 00	--------	100,000 00	1.60	2.00
Los Angeles	3,300,000 00	--------	3,300,000 00	.81	1.21
Madera	--------	--------	--------	1.50	1.90
Marin	--------	--------	--------	1.40	1.75
Mariposa	--------	--------	--------	--------	1.90
Mendocino	57,500 00	1,740 79	59,240 79	1.75	2.35
Merced	10,000 00	--------	10,000 00	1.40	2.00
Modoc	--------	--------	--------	1.30	1.70
Mono	--------	--------	--------	--------	2.00
Monterey	548,000 00	--------	548,000 00	1.40	1.80
Napa	--------	--------	--------	1.39	1.76
Nevada	--------	--------	--------	1.90	2.40
Orange	1,308,000 00	--------	1,308,000 00	1.55	1.95
Placer	--------	--------	--------	2.25	2.65
Plumas	135,100 00	--------	135,100 00	--------	1.85
Riverside	1,260,000 00	--------	1,260,000 00	1.97	2.57
Sacramento	1,485,000 00	39,475 00	1,524,475 00	1.373	1.96
San Benito	278,000 00	--------	278,000 00	2.15	2.40
San Bernardino	1,900,000 00	--------	1,900,000 00	2.14	2.53
San Diego	1,064,000 00	--------	1,064,000 00	1.75	2.45
San Francisco	44,934,700 00	--------	44,934,700 00	2.33	--------
San Joaquin	1,650,000 00	--------	1,650,000 00	1.50	1.90
San Luis Obispo	66,000 00	--------	66,000 00	1.69	2.25
San Mateo	1,373,000 00	22,730 00	1,395,730 00	1.82	2.22
Santa Barbara	250,000 00	--------	250,000 00	1.60	2.15
Santa Clara	300,000 00	--------	300,000 00	1.50	1.92
Santa Cruz	--------	--------	--------	1.70	2.30
Shasta	--------	--------	--------	1.93	2.33
Sierra	--------	--------	--------	1.75	2.25
Siskiyou	--------	--------	--------	1.46	1.86
Solano	190,000 00	--------	190,000 00	1.57	1.97
Sonoma	250,000 00	--------	250,000 00	1.40	1.80
Stanislaus	--------	--------	--------	1.60	2.00
Sutter	--------	--------	--------	1.10	1.50
Tehama	--------	11,000 00	11,000 00	2.37	2.80
Trinity	--------	--------	--------	--------	2.50
Tulare	--------	--------	--------	1.60	2.20
Tuolumne	--------	640 26	640 26	1.66	2.13
Ventura	1,364,000 00	--------	1,364,000 00	1.82	2.15
Yolo	200,000 00	--------	200,000 00	1.30	1.90
Yuba	--------	22 09	22 09	2.00	2.40
Totals	$66,260,300 00	$109,965 88	$66,370,265 88		

Grand Total Value of All Assessed Property in California, 1850-1916.

(From the Reports of the State Controller's Department.)

Year	Total assessed value of property in California	Year	Total assessed value of property in California
1850	$57,670,689	1884	$821,078,767
1851	49,231,052	1885	859,512,384
1852	64,579,375	1886	817,445,729
1853	95,335,646	1887	956,740,805
1854	111,191,630	1888	1,107,952,700
1855	103,887,193	1889	1,111,550,979
1856	115,007,440	1890	1,101,137,290
1857	126,059,461	1891	1,242,300,434
1858	125,955,877	1892	1,275,678,822
1859	131,060,279	1893	1,216,380,398
1860	148,193,540	1894	1,204,347,291
1861	147,811,617	1895	1,132,512,903
1862	160,369,071	1896	1,264,973,043
1863	174,104,955	1897	1,089,373,316
1864	179,164,730	1898	1,132,230,221
1865	183,534,312	1899	1,193,961,761
1866	200,368,826	1900	1,217,648,863
1867	212,205,339	1901	1,241,359,555
1868	237,483,175	1902	1,290,238,964
1869	260,563,879	1903	1,597,944,240
1870	277,538,134	1904	1,545,698,785
1871	267,868,126	1905	1,624,023,172
1872	637,232,823	1906	1,594,231,577
1873	428,747,043	1907	1,879,950,692
1874	611,495,197	1908	1,990,256,945
1875	618,083,315	1909	2,439,566,433
1876	595,073,177	1910	2,372,944,301
1877	586,953,022	1911	2,602,344,933
1878	584,578,036	1912	2,919,342,889
1879	549,142,610	1913	3,114,136,640
1880	666,399,985	1914	3,232,646,152
1881	659,835,762	1915	3,311,446,744
1882	608,555,960	1916	3,577,877,764
1883	765,729,430		

Summary, 1914-1916.

	1914	1915	1916
Total value of property as returned by auditors	$3,075,896,671 00	$3,157,965,465 00	$3,420,871,174 00
Value of railroads as assessed by State Board of Equalization	156,749,481 00	153,481,279 00	157,006,590 00
Funded debt of counties	57,217,400 00	62,414,400 00	66,260,300 00
Floating debt with estimated interest of counties	136,145 66	214,214 43	109,965 00
Total county indebtedness	57,353,545 66	62,628,614 43	66,370,265 88
Number acres land assessed			47,557,195

Bank Clearings of Eight Cities, 1906-1916.

SAN FRANCISCO. SACRAMENTO.

Year	Clearings	Year	Clearings
1906	$1,998,400,779 46	1906	
1907	2,133,883,625 80	1907	
1908	1,757,141,850 08	1908	$44,628,760 60
1909	1,979,872,570 06	1909	54,562,493 31
1910	2,323,772,870 99	1910	69,447,281 94
1911	2,427,075,543 46	1911	78,376,700 21
1912	2,677,561,952 27	1912	92,747,060 69
1913	2,624,428,824 74	1913	108,268,688 39
1914	2,516,004,816 78	1914	103,286,903 09
1915	2,693,688,925 69	1915	101,129,004 87
1916	3,479,862,482 31	1916	127,219,795 29

LOS ANGELES. FRESNO.

1906	$578,635,516 82	1906	
1907	581,803,982 00	1907*	
1908	505,588,756 02	1908	
1909	673,165,728 81	1909	$29,324,258 30
1910	811,387,487 47	1910	37,930,473 07
1911	922,914,526 09	1911	39,782,776 05
1912	1,168,941,700 02	1912	51,400,594 73
1913	1,211,168,979 18	1913	57,384,801 12
1914	1,145,167,110 19	1914	53,442,675 84
1915	1,048,090,667 10	1915	53,554,334 98
1916	1,292,961,997 13	1916	71,926,311 81

OAKLAND. STOCKTON.

1906*		1906	
1907	$140,416,038 98	1907*	
1908	76,847,792 99	1908	$24,415,671 88
1909	96,527,088 09	1909	28,301,936 22
1910	157,380,388 13	1910	32,277,582 57
1911	172,484,561 60	1911	40,350,889 35
1912	192,570,346 29	1912	44,891,763 06
1913	188,730,763 00	1913	45,925,831 09
1914	176,063,061 82	1914	47,257,207 00
1915	181,464,620 08	1915	50,241,377 00
1916	223,044,093 89	1916	71,802,911 00

SAN DIEGO. SAN JOSE.

1906	$36,218,236 32	1906	$10,969,524 94
1907	49,194,870 02	1907	15,504,767 53
1908	37,771,349 22	1908	23,246,315 12
1909	52,094,521 82	1909	25,320,894 50
1910	67,173,976 93	1910	27,828,978 64
1911	86,724,333 47	1911	29,877,754 37
1912	131,894,087 37	1912	35,882,473 55
1913	134,145,293 00	1913	35,730,898 59
1914	103,102,297 90	1914	36,344,989 14
1915	99,636,940 70	1915	34,935,899 53
1916	112,043,265 29	1916	43,806,621 67

*Clearing house only organized this year, so the figures for the twelve months are not available.

INSURANCE.

The total number of insurance companies and associations, except fraternal insurance societies, authorized to transact business in the state of California during the year ending December 31, 1912, and 1914 was as follows:

California Companies.

	1912	1914
Stock, fire and marine	5	5
County mutual fire	21	21
Legal reserve life	7	8
Assessment life, health and accident	2	1
Miscellaneous casualty stock	13	14
Interinsurance associations	5	6
Total (California companies)	53	57

Companies of Other States.

	1912	1914
Stock, fire and marine	99	93
Mutual fire and marine	7	9
Legal reserve life	38	42
Assessment life, health and accident	5	3
Stock miscellaneous	52	50
Interinsurance associations	5	9
Fraternals	----------	50
Total (other states)	206	259

Companies of Foreign Countries.

	1912	1914
Stock, fire and marine	42	47
Stock, miscellaneous	5	6
Total (foreign)	47	53
Grand total	306	369

SUMMARY OF CAPITAL STOCK, ASSETS, LIABILITIES AND SURPLUS.

The following summary shows the total capital, assets, liabilities and surplus of all life, fire, marine and miscellaneous insurance companies authorized to transact business in California on December 31, 1914:

	California companies	Companies of other states	Companies of foreign countries	Totals
Capital stock (paid up)	$14,143,602 00	$135,097,118 45	----------------	$149,240,720 45
Total admitted assets	64,069,345 88	5,072,829,528 11	$145,072,777 98	5,281,971,651 97
Liabilities (except capital)	44,295,255 07	4,634,473,139 92	93,618,000 30	4,772,386,395 29
Net surplus (except capital)	5,630,488 81	303,259,269 74	51,454,777 68	360,344,536 23
Surplus as regards policyholders	19,774,090 81	438,356,388 19	51,454,777 68	509,585,256 68

CALIFORNIA COMPANIES.

	Fire and Marine	Life	Miscellaneous	Totals
Capital stock (paid up)	$2,900,000 00	$3,976,597 00	$7,267,005 00	$14,143,602 00
Total admitted assets	12,766,276 57	39,956,480 33	11,346,588 98	64,069,345 88
Liabilities (except capital)	6,988,938 45	34,295,864 24	3,010,452 38	44,295,255 07
Net surplus (except capital)	2,877,338 12	1,684,019 09	1,069,131 60	5,630,488 81
Surplus as regards policyholders	5,777,338 12	5,660,616 09	8,336,136 60	19,774,090 81

COMPANIES OF OTHER STATES.

	Fire and Marine	Life	Miscellaneous	Totals
Capital stock (paid up)	$77,895,064 70	$19,540,985 00	$37,661,068 75	$135,097,118 45
Total admitted assets	470,353,141 11	4,461,669,670 33	140,806,716 67	5,072,829,528 11
Total liabilities (except capital)	252,002,116 01	4,301,906,779 57	80,564,244 34	4,634,473,139 92
Net surplus (except capital)	140,455,960 40	140,221,905 76	22,581,403 58	303,259,269 74
Surplus as regards policyholders	218,351,025 10	159,762,890 76	60,242,472 33	438,356,388 19

COMPANIES OF FOREIGN COUNTRIES (UNITED STATES BRANCH).

	Fire and Marine	Miscellaneous	Totals
Total admitted assets	$120,688,751 99	$24,384,025 99	$145,072,777 98
Total liabilities	73,077,000 13	20,541,000 17	93,618,000 30
Surplus as regards policyholders	47,611,751 86	3,843,025 82	51,454,777 68

Life Insurance, 1905-1915.

Year	Premiums received	Losses and endorsements paid
1905	$10,550,503 86	$3,400,490 37
1906	10,643,952 00	4,081,162 73
1907	11,017,267 20	4,995,417 25
1908	11,658,903 26	4,343,935 04
1909	12,557,869 31	4,404,398 96
1910	13,501,003 98	4,771,862 70
1911	14,811,167 84	5,719,644 03
1912	16,718,297 79	6,449,765 86
1913	18,454,772 20	6,944,709 28
1914	19,831,311 69	6,913,169 58
1915	20,789,182 26	8,668,950 09

Fire Insurance, 1905-1915.

The following summary shows the premiums received and the losses paid in California during the past ten years:

Year	Premiums received	Losses paid
1905	$10,353,808 04	$3,883,540 20
1906	13,368,350 87	*146,306,376 92
1907	16,242,105 95	7,008,635 97
1908	14,442,623 40	5,345,988 35
1909	15,094,210 60	5,795,279 57
1910	15,900,524 11	6,013,426 48
1911	16,154,903 01	4,604,219 19
1912	16,258,040 76	5,569,008 97
1913	15,897,255 09	7,101,298 64
1914	16,564,373 64	6,754,603 76
1915	16,451,546 33	7,910,764 97

*Losses owing to the great San Francisco fire.

Marine Insurance, 1905-1915.

Year	Premiums received	Losses paid
1905	$1,581,196 83	$1,463,939 42
1906	1,628,982 01	1,394,987 73
1907	1,885,535 22	1,276,704 91
1908	1,864,861 07	994,487 39
1909	1,952,269 99	1,368,892 35
1910	2,180,135 74	1,689,065 81
1911	2,321,318 35	1,375,225 59
1912	2,667,902 00	779,238 00
1913	2,464,976 07	2,011,324 81
1914	2,594,263 90	1,408,158 97
1915	3,152,539 75	1,641,963 82

Industrial Life Insurance, 1905-1915.

Year	Premiums received	Losses paid
1905	$725,705 69	$175,854 95
1906	810,355 30	213,436 29
1907	845,188 77	212,701 78
1908	920,464 73	225,829 95
1909	1,058,790 00	275,574 95
1910	1,285,416 24	305,356 64
1911	1,466,604 96	354,320 28
1912	1,724,786 67	420,678 02
1913	1,943,320 96	509,252 59
1914	2,201,025 05	556,374 33
1915	2,500,166 24	671,221 28

Fraternal Societies, 1914.

The following table shows the total business transacted by all fraternal societies transacting business in California on December 31, 1914:

	Number	Amount
Certificates in force December 31, 1913	4,240,167	$5,774,531,823 85
Certificates issued, transferred or increased in 1914	550,204	641,454,022 50
Certificates terminated or decreased during 1914	453,241	546,890,875 75
Certificates in force December 31, 1914	4,337,130	5,869,094,970 60
Total claims paid during 1914		58,509,830 38

APPENDIX A.*

CALIFORNIA STATE BOARD OF AGRICULTURE.

State Boards of Agriculture and Agricultural Experiment Stations in the United States.

STATE BOARDS OF AGRICULTURE AND EXPERIMENT STATIONS.

There are 43 official bodies or organizations in the United States charged with the promotion of agriculture. Of these 20 are ''State Boards of Agriculture''; 19 are governed by a ''Commissioner of Agriculture''; 3, California, Georgia and Minnesota, have a ''State Agricultural Society,'' and Pennsylvania a ''Secretary of Agriculture.'' Of the above, California is the only one with a dual title, that of the ''State Agricultural Society'' and ''State Board of Agriculture.'' There are also 60 agricultural experiment stations, conducted, in most cases, under the authority of the state universities.

The first agricultural experiment stations were formed some forty years ago, one of the pioneers being that of the State University at Berkeley in 1873. They were subsequently reorganized under the Hatch Act of 1887, which largely extended the number of these most valuable institutions.

Stallion Registration Boards.

The first law regulating the registration of stallions was passed by the state of Wisconsin in 1906, since which time nineteen other states have taken this important step to improve the breed of their horses.

California State Agricultural Society.

(Incorporated May 13, 1854. State Board of Agriculture appointed March 12, 1863.)

The California State Agricultural Society was one of the first to be organized, and ranks as fifth in the United States.

The first State Fair was held in the Music Hall at San Francisco from the fourth to about the twelfth of October, 1854, and the stock show was held on the Pioneer race course. A fair has been held annually ever since—in 1855 at Sacramento, 1856 at San Jose, 1857 at Stockton, 1858 at Marysville, and since then at Sacramento, except in 1915, when it was omitted on account of the Panama-Pacific International Exposition at San Francisco.

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*For a list of states having Agricultural Associations, Animal Pedigree Breeders' Societies, Fruit Associations, Agricultural Newspapers, State and District Fairs, see Report for 1913, pages 257-261.

CALIFORNIA STATE FAIRS, 1854-1916.

Year	Place	Date	Premiums	Races	Total	Presidents
1854	San Francisco	Oct. 4	$4,660	--------	$4,660	F. W. Macondry, San Francisco.
1855	Sacramento	Sept. 25-Oct. 1	6,550	--------	6,550	C. T. Hutchinson, Sacramento.
1856	San Jose	Oct. 7-10	6,746	--------	6,746	E. L. Beard, Alameda.
1857	Stockton	Sept. 29-Oct. 2	7,991	--------	7,991	C. M. Weber,* Stockton.
1858	Marysville	Aug. 23-28	7,435	--------	7,435	John C. Fall, Marysville.
1859	Sacramento	Sept. 13-23	8,139	--------	8,139	C. T. Hutchinson, Sacramento.
1860	Sacramento	Sept. 19-26	8,827	--------	8,827	T. G. Phelps, San Mateo.
1861	Sacramento	Sept. 16-21	7,231	--------	7,231	Jerome C. Davis, Yolo County.
1862	Sacramento	Aug. 31-Sept. 4	--------	--------	5,000	A. Haraszthy, Sonoma.
1863	Sacramento	Sept. 25-Oct. 3	4,894	--------	4,894	Judge Isaac Davis, Yolo County.
1864	Sacramento	Oct. 17-22	6,105	--------	6,105	C. F. Reed, Grafton, Yolo County.
1865	Sacramento	Sept. 18-23	10.658	--------	10,658	C. F. Reed, Grafton, Yolo County.
1866	Sacramento	Sept. 10-15	9,742	--------	9,742	C. F. Reed, Grafton, Yolo County.
1867	Sacramento	Sept. 9-14	9,954	--------	9,954	C. F. Reed, Grafton, Yolo County.
1868	Sacramento	Sept. 15-25	--------	--------	10,000	C. F. Reed, Grafton, Yolo County.
1869	Sacramento	Sept. 6-11	--------	--------	--------	C. F. Reed, Grafton, Yolo County.
1870	Sacramento	Sept. 12-17	--------	--------	30,000	C. F. Reed, Grafton, Yolo County.
1871	Sacramento	Sept. 18-23	--------	--------	40,000	C. F. Reed, Grafton, Yolo County.
1872	Sacramento	Sept. 19-28	--------	--------	20,000	C. F. Reed, Grafton, Yolo County.
1873	Sacramento	Sept. 15-20	8,925	14,200	23,125	R. S. Carey, Yolo.
1874	Sacramento	Sept. 21-28	9,619	15,950	25,569	R. S. Carey, Yolo.
1875	Sacramento	Sept. 15-26	9,214	13,330	22,544	R. S. Carey, Yolo.
1876	Sacramento	Sept. 18-23	--------	--------	--------	R. S. Carey, Yolo.
1877	Sacramento	Sept. 17-22	--------	--------	--------	Marion Biggs, Butte.
1878	Sacramento	Sept. 16-21	10,965	13,775	24,740	Marcus D. Boruck, San Francisco.
1879	Sacramento	Sept. 8-13	--------	12,260	12,260	Hugh M. Larue, Sacramento.
1880	Sacramento	Sept. 20-25	6,502	14,885	21,387	Hugh M. Larue, Sacramento.
1881	Sacramento	Sept. 19-24	6,603	12,525	19,128	J. M. McShafter, San Francisco.
1882	Sacramento	Sept. 11-16	8,651	14.262	22,913	Hugh M. Larue, Sacramento.
1883	Sacramento	Sept. 10-15	8,915	14,005	22,920	P. A. Fingan, Alameda.
1884	Sacramento	Sept. 8-20	11,467	23,165	34,632	P. A. Fingan, Alameda.
1885	Sacramento	Sept. 10-19	13,612	25,145	38,757	Jesse D. Carr, Salinas.
1886	Sacramento	Sept. 9-18	13,370	22,900	36,270	Jesse D. Carr, Salinas.
1887	Sacramento	Sept. 15-24	14,538	23,470	38,008	L. U. Shippee, Stockton.
1888	Sacramento	Sept. 6-15	14,256	25,560	38,816	L. U. Shippee, Stockton.
1889	Sacramento	Sept. 12-21	17,056	30,860	47,916	Christopher Green, Sacramento.
1890	Sacramento	Sept. 11-20	15,761	27,016	42,777	Christopher Green, Sacramento.
1891	Sacramento	Sept. 8-19	17,628	30,081	47,709	Frederick Cox, Sacramento.
1892	Sacramento	Sept. 5-17	17,106	29,950	47,056	Frederick Cox, Sacramento.
1893	Sacramento	Sept. 4-16	13,244	32,715	45,959	John Boggs, Princeton, Colusa Co.
1894	Sacramento	Sept. 3-15	13,447	29,220	42,667	John Boggs, Princeton, Colusa Co.
1895	Sacramento	Sept. 2-14	11,416	32,880	44,296	C. M. Chase, San Francisco.
1896	Sacramento	Sept. 1-19	12,971	47,222	60,193	C. M. Chase, San Francisco.
1897	Sacramento	Sept. 6-18	20,252	35,247	55,499	C. M. Chase, San Francisco.
1898	Sacramento	Sept. 5-17	20,163	28,170	48,333	A. B. Spreckels, San Francisco.
1899	Sacramento	Sept. 4-16	10,529	38.745	49,274	A. B. Spreckels, San Francisco.
1900	Sacramento	Sept. 3-15	9,768	38,745	48,513	A. B. Spreckels, San Francisco.
1901	Sacramento	Sept. 2-14	8.974	30,355	39,329	A. B. Spreckels, San Francisco.
1902	Sacramento	Sept. 8-20	15,000	40,280	55,280	A. B. Spreckels, San Francisco.
1903	Sacramento	Aug. 31-Sept. 12	15,000	31,435	46,435	Benjamin F. Rush, Suisun.
1904	Sacramento	Aug. 22-Sept. 3	15,000	28,597	43,957	Benjamin F. Rush, Suisun.
1905	Sacramento	Sept. 2-9	6.656	24,419	31,075	Benjamin F. Rush, Suisun.
1906	Sacramento	Aug. 25-Sept. 1	7,598	10,640	18,640	Benjamin F. Rush, Suisun.
1907	Sacramento	Sept. 2-14	11,153	14,914	26,067	Benjamin F. Rush, Suisun.
1908	Sacramento	Aug. 29-Sept. 5	11,277	13,410	24,687	H. A. Jastro, Bakersfield.
1909	Sacramento	Aug. 28-Sept. 4	14,183	14,665	28,848	H. A. Jastro, Bakersfield.
1910	Sacramento	Sept. 3-10	14,465	6.930	21,395	H. A. Jastro, Bakersfield.
1911	Sacramento	Aug. 26-Sept. 2	14,790	26,300	41,090	A. L. Scott, San Francisco.
1912	Sacramento	Sept. 14-21	20,000	17,000	37,000	A. L. Scott, San Francisco.
1913	Sacramento	Sept. 13-20	25,000	37,000	62,000	A. L. Scott, San Francisco.
1914	Sacramento	Sept. 12-19	18,609	37,000	55,609	A. L. Scott, San Francisco.
1915	Sacramento	†	--------	--------	--------	John M. Perry, Stockton.
1916	Sacramento	Sept. 2-9	41.536	16,500	58,036	John M. Perry, Stockton.
1917	Sacramento	Sept. 8-15	44,521	27,000	71,521	John M. Perry, Stockton.

*Resigned March 10. Wm. Garrard appointed.

†No fair owing to the Panama-Pacific Exposition at San Francisco.

Many of the books and records of the Society were destroyed by a disastrous flood on the 9th of December, 1861, and 9th of January, 1862, caused by a break in the levee on the north side of Sacramento.

STATE BOARDS OF AGRICULTURE AND DEPARTMENTS OF AGRICULTURE IN THE UNITED STATES (43).*

State	Description and location	Organized
Alabama	Commissioner of Agriculture, Montgomery	1888
Arkansas	Commissioner of Agriculture, Little Rock (Society)	1898
California	State Board of Agriculture	1854
Colorado	State Board of Agriculture, Fort Collins	1877
Connecticut	Commissioner of Agriculture, Hartford	1866
Delaware	State Board of Agriculture, Dover	1901
Florida	Commissioner of Agriculture, Tallahassee	1889
Georgia	Georgia State Agricultural Society, Experiment	1846
Georgia	Commissioner of Agriculture, Atlanta	1874
Idaho	Commissioner of Immigration, Labor and Statistics, Boise	1900
Illinois	State Board of Agriculture, Springfield	1853
Indiana	State Board of Agriculture, Indianapolis	1851
Iowa	State Board of Agriculture, Des Moines	1900
Kansas	State Board of Agriculture, Topeka	1862
Kentucky	Commissioner of Agriculture, Frankfort	1892
Louisiana	Commissioner of Agriculture, Baton Rouge	1880
Maine	Commissioner of Agriculture, Augusta	1855
Massachusetts	State Board of Agriculture, Boston	1852
Michigan	State Board of Agriculture, East Lansing	1881
Minnesota	State Agricultural Society, Hamline	1854
Mississippi	Commissioner of Agriculture, Jackson	1907
Missouri	State Board of Agriculture, Columbia	1865
Montana	Commissioner of Agriculture (Bureau of Agriculture, Labor, Industry and Publicity), Helena	1889
Nebraska	State Board of Agriculture, Lincoln	1858
Nevada	State Board of Agriculture, Carson City	
New Hampshire	State Board of Agriculture, Concord	1870
New Jersey	State Board of Agriculture, Trenton	1873
New York	Commissioner of Agriculture, Albany	1893
North Carolina	Commissioner of Agriculture, Raleigh	1877
North Dakota	Commissioner of Agriculture, Bismarck	1889
Ohio	State Board of Agriculture, Columbia	1846
Oklahoma	State Board of Agriculture, Stillwater	1907
Oregon	State Board of Agriculture, Salem	1861
Pennsylvania	Secretary of Agriculture, Harrisburg	1895
Rhode Island	State Board of Agriculture, Providence	1892
South Carolina	Commissioner of Agriculture, Columbia	1904
South Dakota	State Board of Agriculture, Huron	1884
Tennessee	Commissioner of Agriculture, Nashville	1875
Texas	Commissioner of Agriculture, Austin	1906
Vermont	Commissioner of Agriculture, Plainfield	1872
Virginia	Commissioner of Agriculture, Richmond	1888
West Virginia	Commissioner of Agriculture, Charleston	1891
Wisconsin	State Board of Agriculture, Madison	1897

*Not including Alaska, Guam, Hawaii, Philippine Islands and Porto Rico.

AGRICULTURAL EXPERIMENT STATIONS (60*).

State	Description and location	Date of original organization	Organized under Hatch Act of March 2, 1887
Alabama	(College) Auburn	1872	Feb. 24, 1888
Alabama	(Canebrake) Uniontown	1885	Apr. 1, 1888
Alabama	(Tuskegee Institute) Tuskegee	Feb. 15, 1897	
Arizona	(State University of Tucson)	1885	1890
Arkansas	Fayetteville		Mar. 7, 1889
California	(State University) Berkeley	1873	Mar., 1888
Colorado	Fort Collins		Feb., 1888
Connecticut	(State) New Haven	Mar. 21, 1877	May 18, 1887
Connecticut	(Storrs) Storrs		May 18, 1887
Delaware	Newark		Feb. 21, 1888
Florida	Gainesville		1888
Georgia	Experiment	1888	July 1, 1889
Idaho	Moscow		Feb. 26, 1892
Illinois	Urbana		Mar. 21, 1888
Indiana	Lafayette		Jan. 1, 1888
Iowa	Ames		Feb. 17, 1888
Kansas	Manhattan		Feb. 8, 1888
Kentucky	Lexington	Sept. 25, 1885	Apr., 1888
Louisiana	(Sugar) New Orleans	Sept., 1886	1888
Louisiana	(State) Baton Rouge	Apr., 1887	
Louisiana	(North) Calhoun	May, 1887	July 1, 1909
Louisiana	(Rice) Crowley		
Maine	Orono	Mar., 1885	Oct. 1, 1887
Maryland	College Park		Mar. 9, 1888
Massachusetts	Amherst	1882	Mar. 2, 1888
Michigan	East Lansing		Feb. 26, 1888
Minnesota	(University Farm) St. Paul	Mar. 7, 1885	1888
Mississippi	(Agricultural College)		Jan. 27, 1888
Missouri	(College) Columbia		Jan., 1888
Missouri	(Fruit) Mountain Grove	Feb. 1, 1900	
Montana	Bozeman		Feb. 16, 1893
Nebraska	Lincoln	Dec. 16, 1884	June 14, 1887
Nevada	Reno		Dec., 1887
New Hampshire	Durham		Aug. 4, 1887
New Jersey	(State) New Brunswick	Mar. 10, 1880	
New Jersey	(College) New Brunswick		Apr. 26, 1888
New Mexico	(College of Agriculture) State College		Dec. 14, 1889
New York	(State) Geneva	Mar. 1, 1882	
New York	(Cornell University) Ithaca	1879	Apr. 1, 1888
North Carolina	(College) West Raleigh	Mar. 12, 1877	Mar. 7, 1887
North Carolina	(State) Raleigh	July 1, 1907	
North Dakota	(Agricultural College)		Mar., 1890
Ohio	Wooster	Apr. 25, 1882	Apr. 2, 1888
Oklahoma	Stillwater		1891
Oregon	Corvallis		July, 1888
Pennsylvania	(State College)		June 30, 1887
Pennsylvania	Institute of Animal Nutrition		July 1, 1907
Rhode Island	Kingston		July 30, 1888
South Carolina	(Clemson College)		Jan., 1888
South Dakota	Brookings		Mar. 13, 1887
Tennessee	Knoxville	June 8, 1882	Aug. 4, 1887
Texas	(College Station)		Jan. 25, 1888
Utah	Logan		Apr., 1890
Vermont	Burlington		Feb. 28, 1888
Virgina	(College) Blackburg		Oct. 16, 1888
Virgina	(Truck) Norfolk	Feb., 1907	
Washington	Pullman		1892
West Virginia	Morgantown		1887
Wisconsin	Madison	1883	1887
Wyoming	(State University) Laramie		Mar. 1, 1891

*Not including Alaska, Guam, Hawaii, Philippine Islands and Porto Rico.

SUPPLEMENT

SUMMARY OF THE RESOURCES

OF THE

STATE OF CALIFORNIA

BY COUNTIES.

The brief description of each county which follows, has been greatly condensed in order to keep it within the space available.

County statistics were first obtained under an act passed in 1905, under which county statisticians were appointed, but the result was a failure, as many counties omitted to supply the figures required, and therefore no complete statistics for the state as a whole could be published. In 1910 eleven counties failed to make any report, and in other years the number was even greater.

In 1911 county statisticians were abolished, and the present system established, under which the cost of gathering statistics was reduced from about $50,000 per annum (paid by the counties) to $5,000; the latter sum, however, is quite inadequate to give entirely satisfactory results, or to make the report as complete as it might be made with a comparatively small increase in the expenditure.

The brief description of each county which follows was originally supplied by the county boards of supervisors under the act of 1905, but has since been revised from time to time with the aid of local authorities.

The size of farms, number of animals, and the figures relating to crops, fruit trees, and irrigation are those given in the last census, but the totals given for orchard and tropical fruit trees do not always agree, as some contain a small number of miscellaneous varieties which are not specified, although included in the total. Later statistics brought down to 1916 are given in the body of the Report under their respective headings.

Some correspondents think that all the details contained in the census reports should be revised annually, but they do not realize the magnitude of the undertaking, or the enormous labor and expense it would entail; and that without any actual benefit, for as a rule the totals do not vary greatly in a single year. The pay of the enumerators alone in this state, at the last census, amounted to $151,750.

The source of the statistics contained in this report are the most trustworthy that can be obtained, and the number of farm animals, farm crops, fruits, and all other products, are brought down to date, and when estimated, the figures are strictly conservative.

TABLE XLIII.

Temperature, Rainfall, and Snowfall in Each County in 1916.

(Compiled from the Report of the United States Weather Bureau, San Francisco.)

Counties	County seat or observation station	Elevation, feet	Temperature		Rainfall, inches	Snowfall, inches (unmelted)
			Highest	Lowest		
Alameda	Oakland	36	91	30	30.69	T.
Alpine	Tamarack*	8,000	81	—22	60.27	538.0
Amador	Electra*	725	103	28	38.63	.2
Butte	Oroville (near)	250	108	26	31.92	4.5
Calaveras	Mokelumne Hill*	1,550	102	24	35.26	19.0
Colusa	East Park*	--------	109	10	18.69	26.5
Contra Costa	Antioch*	46	105	29	15.75	T.
Del Norte	Crescent City	125	93	27	91.16	13.5
El Dorado	Placerville	1,875	100	14	45.27	34.0
Fresno	Fresno	293	108	28	12.50	.9
Glenn	Willows	136	111	24	17.41	14.0
Humboldt	Eureka	64	75	31	37.95	1.4
Imperial	Calexico*	0	116	25	4.44	0
Inyo	Independence	3,907	103	—2	12.84	78.2
Kern	Bakersfield	404	110	24	7.96	0
Kings	Hanford	249	108	20	11.55	0
Lake	Sulphur Banks*	1,350	105	12	23.72	25.3
Lassen	Madeline*	5,270	91	—23	18.60	150.0
Los Angeles	Los Angeles	293	96	36	23.29	0
Madera	Storey*	296	105	26	18.02	0
Marin	Point Reyes*	490	80	35	20.18	T.
Mariposa	Yosemite*	3,960	103	3	49.43	177.0
Mendocino	Ukiah	620	109	20	34.44	15.5
Merced	Merced	173	105	25	16.47	2.0
Modoc	Alturas	4,400	99	—18	15.22	65.7
Mono	Bridgeport	6,500	89	—36	13.41	173.0
Monterey	Salinas	40	88	25	18.81	0
Napa	St. Helena*	255	108	25	43.51	7.0
Nevada	Nevada City	2,850	98	9	57.33	81.5
Orange	Yorba Linda*	405	101	29	22.42	6.0
Placer	Auburn	1,360	103	24	32.77	9.5
Plumas	Quincy	3,400	96	—8	49.25	187.0
Riverside	Riverside	851	105	25	16.60	T.
Sacramento	Sacramento	71	105	30	18.27	3.5
San Benito	Hollister	284	100	25	19.91	T.
San Bernardino	San Bernardino	1,054	105	23	25.62	T.
San Diego	San Diego	87	84	36	11.56	0
San Francisco	San Francisco	207	87	37	28.09	T.
San Joaquin	Stockton (S. H.)	23	102	25	18.85	3.0
San Luis Obispo	San Luis Obispo	201	96	29	36.40	T.
San Mateo	Redwood City	--------	--------	--------	--------	--------
Santa Barbara	Santa Barbara	130	91	32	32.19	T.
Santa Clara	San Jose	95	98	27	36.40	T.
Santa Cruz	Santa Cruz	20	90	27	34.13	0
Shasta	Redding	552	110	24	38.42	22.0
Sierra	Downieville	3,150	102	6	75.32	159.7
Siskiyou	Sisson*	3,555	95	—1	33.06	212.0
Solano	Vacaville*	175	107	22	36.38	7.0
Sonoma	Santa Rosa	181	97	21	32.35	0
Stanislaus	Newman*	91	105	21	14.00	4.0
Sutter	Yuba City	57	--------	--------	--------	--------
Tehama	Red Bluff	307	113	27	20.09	11.0
Trinity	Weaverville	2,162	107	7	32.06	63.0
Tulare	Visalia	334	105	21	12.79	T.
Tuolumne	Sonora	1,825	98	17	44.09	4.5
Ventura	Ojai Valley*	900	105	25	36.25	0
Yolo	Davis*	51	110	20	20.10	7.0
Yuba	Marysville	67	108	24	21.99	4.0

Where there is no observation station at the county seat some other station is given. There is no observation station in San Mateo or Sutter counties. In the last named the figures for Yuba may be accepted as correct, as Marysville is on the opposite side of the river.

*Observation stations.

SUMMARY OF THE WEATHER IN 1916.

Abnormal weather prevailed in California during the year 1916. It was the coldest of the twenty years during which state-wide records have been kept. In each of four months, January, October, November and December, the mean temperature for the state as a whole was the lowest ever recorded for these respective months.

Extreme temperatures ranged from 127°, which occurred at Greenland Ranch, Inyo County, on July 23, to 36°, which was recorded at Bridgeport, Mono County, on January 31, a range for the state of 163°. The average precipitation for the state was 34.84 inches, an amount which has been exceeded but twice during the twenty years of record. But 2.42 inches, or 7 per cent of the total, fell during the dry half year, April to September, inclusive. In southern California the year was wetter than usual; in northern California, however, the year was drier than usual. Two stations in the high Sierras received more than 100 inches of rain during the year, and one station, Bagdad, in the Mojave Desert, received less than one inch, all of which fell within 24 hours. Snowfall in the mountains was extremely heavy in January and moderately heavy in December. Three stations which recorded upwards of 500 inches of snow were: Fordyce Dam, Nevada County, 579.0 inches; Tamarack, Alpine County, 538.0 inches, and Summit, Placer County, 530.5 inches.

ALAMEDA COUNTY.

Date of creation, March 25, 1853.

		1890	1900	1910	1916 (estimated)
Land area 732 square miles.	Population	93,864	130,197	246,131	------
County seat, Oakland.	Population	48,682	66,960	150,174	198,604

Population per square mile, 336.2.

		Highest	Lowest		Inches		Inches
Elevation, 36 feet. 1916:	Temperature	91	30	Rainfall	30.69	Snow	T

Alameda County fronts on the bay of San Francisco for a distance of 38 miles, with an average width of 25 miles, extending to and beyond the summit of the Contra Costa hills, comprising numerous beautiful valleys, besides the broad Alameda Valley, which last is bounded by the waters of the bay on the one side and the Contra Costa hills on the other, and is one of the richest and most fertile valleys in the state. The principal stream is Alameda Creek. There are other creeks crossing the county and emptying into the bay, two of which furnish water for the city of Oakland. The country around Hayward is one of the great fruit-raising regions, many millions of pounds being shipped annually.

The soils immediately along the bay in Alameda County and the marshes formed by the overflow are heavy, but very fertile when reclaimed. Then comes a broad belt of rich, black adobe that is crossed by deposits of alluvium made by shifting channels of streams running down from the Coast Range. In the Niles region are lighter loams. About Livermore are uplands, bench, and valley lands. The Pleasanton section consists of agricultural and grazing lands. The soil is a very rich sediment, producing hay, grain, potatoes, hops, and beets in abundance. At Alvarado the surrounding country is a fine farming and fruit region, and gardening and dairying are largely carried on.

Alameda County was among the first to begin the planting of orchards and vineyards. The county is divisible into three sections—the cherry district, the apricot district, and the vineyard district.

Alameda is *par excellence* a vegetable-producing county, since the profit in peas, potatoes, tomatoes, rhubarb, asparagus, and several other vegetables is large. Many acres in this county are planted in tomatoes, which prove to be a most profitable crop.

The growing of peas for canning has assumed importance. The output of the San Leandro cannery, located in this county, has reached as high as 1,200 cases per day, and 3½ tons of peas have been grown upon a single acre.

The average annual output of salt recovered from San Francisco Bay, in Alameda County, is very large, including both coarse and fine salt.

ALAMEDA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	148
3 to 9 acres	589
10 to 19 acres	405
20 to 49 acres	424
50 to 99 acres	204
100 to 174 acres	238
175 to 259 acres	116
260 to 499 acres	163
500 to 999 acres	91
1,000 acres and over	44
Total	2,422
Total in 1900	2,787

Land and Farm Areas.

Approximate land, acres	468,480
Land in farms in 1910	311,327
Land in farms in 1900	398,289
Improved land in farms in 1910	177,314
Improved land in farms in 1900	226,118
Woodland in farms	51,484
Other unimproved land	82,529

Value of all Farm Property.

Total value in 1910	$36,840,669
Total value in 1900	34,619,536
Per cent increase, 1900-1910	6.4
Land in 1910	29,537,208
Land in 1900	28,751,590
Buildings in 1910	4,463,555
Buildings in 1900	3,485,310
Implements and machinery in 1910	817,861
Implements and machinery in 1900	780,040
Domestic animals, poultry and bees in 1910	2,022,045
Domestic animals, poultry and bees in 1900	1,602,596

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	9,172
Other cows	5,827
Yearling heifers	2,609
Calves	4,113
Yearling steers and bulls	1,107
Other steers and bulls	1,491
Total	24,319
Value	$611,907
Horses—	
Mature horses	9,266
Yearling colts	842
Spring colts	536
Total	10,644
Value	$1,151,631
Mules—	
Mature mules	223
Yearling colts	4
Total	227
Value	$28,545
Asses and burros—	
Number	3
Value	$48
Swine—	
Mature hogs	3,640
Spring pigs	2,770
Total	6,410
Value	$55,333
Sheep—	
Rams, ewes and wethers	5,680
Spring lambs	3,507
Total	9,187
Value	$32,559
Goats—	
Number	64
Value	$321
Total value all domestic animals	$1,880,344
Poultry and bees—	
Poultry of all kinds	240,914
Value	$139,589
Colonies of bees	610
Value	$2,112

Principal Crops.

Description	Acres	Bushels
Corn	503	13,097
Oats	1,725	53,745
Wheat	1,075	21,535
Barley	12,650	473,575
Kafir corn and milo maize	-----	10
Dry edible beans	86	2,933
Potatoes	1,655	175,920

Hay and forage—	Acres	Tons
Timothy and clover mixed	84	115
Clover alone	407	472
Alfalfa	1,109	3,514
Other tame or cultivated grasses	5,202	8,060
Wild, salt, or prairie grasses	729	1,030
Grains cut green	73,041	99,538
All other hay and forage	163	805
Totals	80,735	113,534

Poultry products—	
Poultry raised, number	230,417
Eggs produced, dozen	1,391,728
Value poultry and eggs produced	$471,769
Honey and wax—	
Honey produced, pounds	9,848
Wax produced, pounds	179
Value of honey and wax produced	$1,321
Wool—	
Wool, fleeces shorn	5,783
Value wool and mohair produced	$4,930
Special crops—	
Potatoes, acres	1,655
Sweet potatoes, acres	2
All other vegetables, acres	7,459
Sugar beets, acres	2,516

Orchard fruits—	Number bearing trees
Apples	26,045
Apricots	270,461
Cherries	89,284
Peaches and nectarines	12,555
Pears	70,382
Prunes and plums	157,981
Total	627,824

ALAMEDA COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Tropical fruit—	
Figs	482
Lemons	660
Oranges	3,782
Pomeloes	4
Olives	10,963
Total	15,900
Grapevines—	
Number in bearing	2,390,959
Small fruits—	
Strawberries, acres	18
Blackberries and dewberries, acres	12
All others, acres	371
Total	401

Nuts—	Number bearing trees
Almonds	21,190
Pecans	5
Walnuts	3,726
Total	25,250

Irrigation.

Number of farms irrigated in 1909	50
Acres irrigated in 1909	1,859
Acreage enterprises were capable of irrigating in 1910	1,872
Acreage included in projects	2,605
Main ditches, number	49
Length, miles	21
Pumped wells, number	56
Cost of irrigation enterprises up to July 1, 1910	$57,156
Average cost per acre irrigation enterprises were capable of irrigating in 1910	20.5

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	14,841	$132,765
Limestone, tons	10	20
Manganese, tons	319	3,652
Pyrite, tons	11,287	45,148
Salt, tons	103,768	220,977
Stone, miscellaneous		457,381
Other minerals*		1,740
Total		$861,683

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*Includes asbestos, chrome, and pottery clay.

ALPINE COUNTY.

Date of creation, March 16, 1864; reorganized in 1900.

Land area, 776 square miles.
County seat, Markleeville. Township No. 1. Population ---------------------- 309
Population per square mile, 0.4.

Tamarack (Station):	Highest	Lowest		Inches		Inches
Elevation, 8,000 feet. 1916: Temperature	81	22	Rainfall	60.27	Snow	538.0

Alpine County is one of the counties on the eastern border, and out of the way, as far as her means of communication with the other counties of the state is concerned, there being no public road maintained to the border, thereby rendering it necessary to turn to the state of Nevada for a route to reach the capital at Sacramento, or any other part of the state. This condition militates against the development of Alpine County's many natural resources, as intending investors or purchasers are not afforded a convenient route of reaching the county.

The resources of Alpine County are great, especially in mineral, timber, and water power, the latter offering a field of immediate development to enterprising capital.

ALPINE COUNTY SUMMARY.

Number of Farms Classified by Size.

20 to 49 acres	1
50 to 99 acres	3
100 to 174 acres	4
175 to 259 acres	9
260 to 499 acres	14
500 to 999 acres	3
1,000 acres and over	8
Total	42
Total in 1900	37

Land and Farm Areas.

Approximate land, acres	496,640
Land in farms in 1910	32,001
Land in farms in 1900	15,681
Improved land in farms in 1910	7,579
Improved land in farms in 1900	4,391
Woodland in farms	7,597
Other unimproved land	16,828

Value of all Farm Property.

Total value in 1910	$811,442
Total value in 1900	324,441
Per cent increase, 1900-1910	150.1
Land in 1910	530,968
Land in 1900	198,100
Buildings in 1910	88,475
Buildings in 1900	45,400
Implements and machinery in 1910	30,405
Implements and machinery in 1900	10,810
Domestic animals, poultry and bees in 1910	161,594
Domestic animals, poultry and bees in 1900	70,131

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	759
Other cows	661
Yearling heifers	485
Calves	426
Yearling steers and bulls	400
Other steers and bulls	23
Total	2,754
Value	$58,619
Horses—	
Mature horses	376
Yearling colts	38
Spring colts	12
Total	426
Value	$36,325
Mules—	
Mature mules	18
Value	$1,420
Asses and burros—	
Number	14
Value	$200
Swine—	
Mature hogs	309
Spring pigs	208
Total	517
Value	$2,515
Sheep—	
Rams, ewes and wethers	9,832
Spring lambs	6,808
Total	16,640
Value	$61,200
Goats—	
Number	10
Value	$44
Total value all domestic animals	$160,323

ALPINE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Poultry and bees—	
Poultry of all kinds	2,159
Value	$1,139
Colonies of bees	49
Value	$132

Principal Crops.

	Acres	Bushels
Oats	135	7,274
Wheat	618	19,464
Barley	38	1,480
Dry edible beans	-----	3
Potatoes	22	2,944

Hay and forage—	Acres	Tons
Timothy alone	206	315
Timothy and clover mixed	351	567
Clover alone	10	20
Alfalfa	1,081	2,573
Other tame or cultivated grasses	697	699
Wild, salt, or prairie grasses	1,116	1,309
Grains cut green	355	312
All other hay and forage	30	20
Totals	3,846	5,815

Poultry products—	
Poultry raised, number	2,547
Eggs produced, dozen	8,904
Value poultry and eggs produced	$3,618
Honey and wax—	
Honey produced, pounds	220
Value of honey and wax produced	$23
Wool—	
Wool, fleeces shorn	6,790
Value wool and mohair produced	$9,561

Special crops—	
Potatoes, acres	22
All other vegetables, acres	14

Orchard fruits—	Number bearing trees
Apples	1,140
Apricots	7
Cherries	63
Peaches and nectarines	28
Pears	79
Prunes and plums	214
Total	1,531

Tropical fruits—	
Olives	4
Grapevines—	
Number in bearing	9,000

Nuts—	Number bearing trees
Almonds	12

Irrigation.

Number of farms irrigated in 1909	32
Acres irrigated in 1909	3,349
Acreage enterprises were capable of irrigating in 1910	3,399
Acreage included in projects	3,435
Main ditches, number	25
Length, miles	34
Laterals, number	3
Length, miles	1
Cost of irrigation enterprises up to July 1, 1910	$7,493
Average cost per acre irrigation enterprises were capable of irrigating in 1910	2.20

Mineral Production in 1915.

Number of mineral springs	1

Alpine has usually shown a small production of gold and silver, but dropped out of the list of producing counties for the last two years.

AMADOR COUNTY.

Date of creation, May 11, 1854.

		1890	1900	1910	1915 (estimated)
Land area, 601 square miles.	Population	10,320	11,116	9,086	------
County seat, Jackson City.	Population	-----	-----	2,035	2,500

Population per square mile, 15.1.

Electra (Station):		Highest	Lowest		Inches		Inches
Elevation 725 feet.	1916: Temperature	103	28	Rainfall	38.63	Snow	2

Amador adjoins El Dorado County on the south, Alpine on the west, Calaveras on the north and Sacramento and San Joaquin counties on the east. It is inland and occupies the east central portion of the state. It has no navigable rivers. The Cosumnes forms a part of its northern boundary and the Mokelumne forms its entire southern boundary. Both of the rivers are tributaries of the Sacramento. Varying, in main, in altitude from 30 feet to 1,500 feet, and having a most productive soil, and the great portion of the county being a rolling, or foothill region, it is adapted to the cultivation of any kind of farm, of horticultural, or of viticultural product.

Grain and hay are cultivated to a considerable extent. In many parts of the western portion of the county a great variety of vegetables is grown throughout the year. Yielding, as the county does, an abundance of the best natural grasses, it offers inducements to stockmen.

Distinctively, the county is a region of mineral deposits. The one resource, however, that is paramount, is gold from the quartz mine.

Mountain lakes and valleys and river canyons furnish abundant opportunity for those needing recreation, or for those that enjoy hunting and fishing. Mineral springs, having medicinal properties that are prescribed in certain cases, are found in different parts of the county.

AMADOR COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	13
10 to 19 acres	19
20 to 49 acres	41
50 to 99 acres	52
100 to 174 acres	145
175 to 259 acres	64
260 to 499 acres	105
500 to 999 acres	58
1,000 acres and over	38
Total	537
Total in 1900	560

Land and Farm Areas.

Approximate land, acres	384,640
Land in farms in 1910	291,730
Land in farms in 1900	214,024
Improved land in farms in 1910	45,969
Improved land in farms in 1900	48,936
Woodland in farms	114,960
Other unimproved land	129,801

Value of all Farm Property.

Total value in 1910	$4,820,809
Total value in 1900	3,318,850
Per cent increase 1900-1910	45.3
Land in 1910	3,252,895
Land in 1900	$2,185,150
Buildings in 1910	589,925
Buildings in 1900	495,630
Implements and machinery in 1910	141,379
Implements and machinery in 1900	127,180
Domestic animals, poultry and bees in 1910	836,610
Domestic animals, poultry and bees in 1900	510,890

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,747
Other cows	7,985
Yearling heifers	2,175
Calves	3,444
Yearling steers and bulls	1,970
Other steers and bulls	3,945
Total	22,266
Value	$506,380
Horses—	
Mature horses	2,291
Yearling colts	218
Spring colts	176
Total	2,685
Value	$233,128

AMADOR COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	212
Yearling colts	10
Spring colts	17
Total	239
Value	$27,590
Asses and burros—	
Number	23
Value	$458
Swine—	
Mature hogs	3,623
Spring pigs	1,673
Total	5,296
Value	$32,647
Sheep—	
Rams, ewes, and wethers	3,919
Spring lambs	2,726
Total	6,645
Value	$20,023
Goats—	
Number	1,597
Value	$3,673
Total value all domestic animals	$823,899
Poultry and bees—	
Poultry of all kinds	23,630
Value	$12,380
Colonies of bees	170
Value	$331

Principal Crops.

	Acres	Bushels
Corn	301	12,526
Oats	1,354	30,813
Wheat	293	5,169
Barley	1,513	29,071
Dry edible beans	3	31
Potatoes	125	14,054

Hay and forage—	Acres	Tons
Timothy alone	6	6
Timothy and clover mixed	29	29
Clover alone	33	33
Alfalfa	1,724	4,778
Other tame and cultivated grasses	968	993
Wild, salt, or prairie grasses	3,599	3,471
Grains cut green	8,090	8,651
Totals	14,449	17,961

Poultry products—	
Poultry raised, number	23,628
Eggs produced, dozen	142,824
Value poultry and eggs produced	$49,621
Honey and wax—	
Honey produced, pounds	2,402
Wax produced, pounds	100
Value of honey and wax produced	$326
Wool—	
Wool, fleeces shorn	7,253
Mohair and goat hair, fleeces shorn	449
Value wool and mohair produced	$5,882

Special crops—	
Potatoes, acres	125
Sweet potatoes, acres	1
All other vegetables, acres	200
Sugar beets, acres	315

Orchard fruits—	Number bearing trees
Apples	8,592
Apricots	1,197
Cherries	1,143
Peaches and nectarines	16,349
Pears	5,112
Prunes and plums	10,685
Total	43,332

Tropical fruits—	Number bearing trees
Figs	347
Lemons	8
Oranges	151
Olives	274
Total	780

Grapevines—	
Number in bearing	314,604
Small fruits—	
Strawberries, acres	6
Blackberries and dewberries, acres	13
All others	10
Total	29

Nuts—	Number bearing trees
Almonds	628
Pecans	1
Walnuts	185
Total	830

Irrigation.

Number of farms irrigated in 1909	73
Acres irrigated in 1909	826
Acreage enterprises were capable of irrigating in 1910	3,973
Acreage included in projects	4,139
Main ditches, number	55
Length, miles	185
Laterals, number	12
Length, miles	56
Cost of irrigation enterprises up to July 1, 1910	$265,608
Average cost per acre irrigation enterprises were capable of irrigating in 1910	66.85

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	4,000	$80,000
Clay, pottery, tons	40,156	38,879
Copper, pounds	4,185	732
Gold	-----	3,894,125
Lead, pounds	523	25
Lime, barrels	1,000	1,200
Silica, tons	13,339	16,142
Silver	-----	20,409
Stone, miscellaneous	-----	1,300
Other minerals	-----	10,950
Total	-----	$4,063,762

BUTTE COUNTY.

Date of creation, February 18, 1850.

Land area, 1,722 square miles.
County seat, Oroville.
Population per square mile, 15.9.

	1890	1900	1910	1915 (estimated)
Population	17,939	17,117	27,301	------
Population	-----	-----	3,859	3,300

Elevation, 250 feet. 1916:	Highest	Lowest		Inches		Inches
Temperature	108	26	Rainfall	31.92	Snow	4.5

Butte County is situated in the northern and eastern Sacramento Valley, and embodies within its confines both mountain, foothill, and valley land. Its climate is most diverse, and in its confines are grown all the products to be found in the temperate and semi-tropical zones. In the higher altitudes, apples thrive, while in the lowest stretches of the rolling foothills, oranges and olives reach perfection. On the broad plains great rice fields are now being planted, and the industry promises to rival that of alfalfa and dairy farming and the more extensive grain farming that has hitherto prevailed. Deciduous fruits of every kind are grown. Large olive pickling works are located in Oroville. The olive crop in the northern part of the state for 1914 was estimated to amount to about 10,000 tons. There are also a number of orange packing houses in the county.

The county is exceptionally well watered. Through it runs the Feather River, with a large number of tributary streams. On one boundary is the great Sacramento River. As a result of the abundance of water, increased attention is being given to irrigation. The Butte County canal covers thousands of acres around Gridley, where the utmost prosperity prevails.

Butte County is also the third largest gold-producing county of the state. The chief gold-dredging field lies around Oroville.

The county was the first to grow rice on a commercial scale, at Biggs and Gridley, and it is now the largest rice-growing county in the state.

BUTTE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	116
10 to 19 acres	186
20 to 49 acres	321
50 to 99 acres	143
100 to 174 acres	220
175 to 259 acres	127
260 to 499 acres	171
500 to 999 acres	116
1,000 acres and over	98
Total	1,500
Total in 1900	1,179

Land and Farm Areas.

Approximate land, acres	1,102,080
Land in farms in 1910	490,777
Land in farms in 1900	677,080
Improved land in farms in 1910	247,097
Improved land in farms in 1900	302,029
Woodland in farms	119,126
Other unimproved land	124,554

Value of all Farm Property.

Total value in 1910	$24,086,440
Total value in 1900	15,535,404
Per cent increase 1900-1910	55.0
Land in 1910	19,404,863
Land in 1900	12,460,530
Buildings in 1910	2,281,132
Buildings in 1900	1,434,870
Implements and machinery in 1910	532,320
Implements and machinery in 1900	439,390
Domestic animals, poultry, and bees in 1910	1,868,125
Domestic animals, poultry, and bees in 1900	1,200,614

Domestic Animals on Farms and Ranges

Cattle—	
Dairy cows	4,713
Other cows	8,359
Yearling heifers	2,605
Calves	3,772
Yearling steers and bulls	2,109
Other steers and bulls	4,660
Total	26,584
Value	$673,968

CALAVERAS COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes, and wethers	10,145
Spring lambs	5,215
Total	15,360
Value	$54,509
Goats—	
Number	3,348
Value	$7,931
Total value all domestic animals	$779,690
Poultry and bees—	
Poultry of all kinds	23,242
Value	$13,519
Colonies of bees	362
Value	$992

Principal Crops.

	Acres	Bushels
Corn	80	1,776
Oats	108	2,121
Wheat	51	439
Barley	222	4,833
Kafir corn and milo maize	5	48
Dry edible beans	8	238
Potatoes	147	20,997

Hay and forage—	Acres	Tons
Timothy alone	79	72
Timothy and clover mixed	118	290
Clover alone	102	206
Alfalfa	649	2,313
Other tame and cultivated grasses	662	587
Wild, salt, or prairie grasses	4,648	3,431
Grains cut green	9,023	8,787
Totals	15,281	15,686

Poultry products—	
Poultry raised, number	31,410
Eggs produced, dozen	107,387
Value poultry and eggs produced	$49,807
Honey and wax—	
Honey produced, pounds	8,413
Wax produced, pounds	118
Value of honey and wax produced	$632
Wool—	
Wool, fleeces shorn	15,677
Mohair and goat hair, fleeces shorn	517
Value wool and mohair produced	$11,551
Special crops—	
Potatoes, acres	147
All other vegetables, acres	278
Sugar beets, acres	1

Orchard fruits—	Number bearing trees
Apples	13,341
Apricots	672
Cherries	459
Peaches and nectarines	5,954
Pears	2,178
Prunes and plums	8,265
Total	31,276

Tropical fruits—	Number bearing trees
Figs	1,839
Lemons	19
Oranges	388
Pomeloes	3
Olives	4,065
Total	6,315

Grapevines—	
Number in bearing	212,300
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	14
All others, acres	15
Total	34

Nuts—	Number bearing trees
Almonds	14,624
Pecans	6
Walnuts	832
Total	15,619

Irrigation.

Number of farms irrigated in 1909	154
Acres irrigated in 1909	1,275
Acreage enterprises were capable of irrigating in 1910	3,161
Acreage included in projects	3,919
Main ditches, number	148
Length, miles	124
Laterals, number	32
Length, miles	31
Flowing wells, number	6
Pumped wells, number	7
Cost of irrigation enterprises up to July 1, 1910	$121,033
Average cost per acre irrigation enterprises were capable of irrigating in 1910	32.29

Mineral Production in 1915.

Substance	Amount	Value
Copper, pounds	4,031,149	$705,451
Gold		1,391,134
Lead, pounds	163	8
Mineral water, gallons	15,343	5,752
Silver		53,298
Stone, miscellaneous		1,900
Other minerals*		4,350
Total		$2,161,893

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*Includes asbestos, fuller's earth, mineral paint, platinum and silica.

COLUSA COUNTY.

Date of creation, February 18, 1850.

Land area, 1,140 square miles.
County seat, Colusa (town).
Population per square mile, 6.8.

	1890	1900	1910	1915 (estimated)
Population	14,640	7,364	7,732	------
Population	1,336	1,441	1,582	2,000

East Park (Station):

		Highest	Lowest		Inches		Inches
Elevation, — feet.	1916: Temperature	109	10	Rainfall	18.69	Snow	26.5

Colusa County is situated in the heart of the great Sacramento Valley. The fertile soil, the temperate climate, the extreme dryness of the atmosphere during two-thirds of the year, and, lastly, a sufficient rainfall, make possible the production of great wealth from the fertile acres of this county.

The western portion of the county is principally mountainous, with some very productive valleys intervening. Cattle and live stock interests prevail. Several mineral springs are located in this portion of the county, and thousands of bottles of mineral water are shipped annually. At Sites two quarries take out stone, known as the famous Colusa sandstone, from which many prominent buildings in San Francisco are built.

Colusa County was one of the first to grow rice, and now has a considerable acreage in that grain.*

Almonds now form an important crop in this county, and in the Arbuckle district about 5,000 trees are planted, but many are still nonbearing. The crop of 1916 amounted to 100 tons, of first-grade quality, and the prices were about 25 per cent higher than the previous year.

COLUSA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	31
10 to 19 acres	35
20 to 49 acres	85
50 to 99 acres	42
100 to 174 acres	90
175 to 259 acres	30
260 to 499 acres	129
500 to 999 acres	104
1,000 acres and over	120
Total	667
Total in 1900	582

Land and Farm Areas.

Approximate land, acres	729,600
Land in farms in 1910	522,376
Land in farms in 1900	550,002
Improved land in farms in 1910	336,509
Improved land in farms in 1900	358,227
Woodland in farms	38,252
Other unimproved land	147,615

Value of all Farm Property.

Total in 1910	$19,602,208
Total in 1900	13,054,483
Per cent increase 1900-1910	50.2
Land in 1910	16,066,035
Land in 1900	$10,885,350
Buildings in 1910	1,204,780
Buildings in 1900	838,420
Implements and machinery in 1910	419,557
Implements and machinery in 1900	417,690
Domestic animals, poultry and bees in 1910	1,911,836
Domestic animals, poultry and bees in 1900	913,023

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,128
Other cows	6,571
Yearling heifers	2,140
Calves	2,606
Yearling steers and bulls	1,556
Other steers and bulls	2,619
Total	†18,750
Value	†$420,618
Horses—	
Mature horses	3,992
Yearling colts	481
Spring colts	259
Total	4,732
Value	$428,700

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*For details regarding rice, see pages 80-82.

†Includes animals, age or sex not specified.

COLUSA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	4,607
Yearling colts	437
Spring colts	247
Total	5,291
Value	$629,345
Asses and burros—	
Number	65
Value	$15,275
Swine—	
Mature hogs	17,646
Spring hogs	10,418
Total	28,064
Value	$161,174
Sheep—	
Rams, ewes, and wethers	39,801
Spring lambs	24,791
Total	64,592
Value	$202,703
Goats—	
Number	2,154
Value	$7,271
Total value all domestic animals	$1,874,086
Poultry and bees—	
Poultry of all kinds	61,113
Value	$33,372
Colonies of bees	1,406
Value	$4,378

Principal Crops.

	Acres	Bushels
Corn	706	16,619
Oats	771	12,556
Wheat	11,168	221,549
Barley	89,985	1,949,223
Kafir corn and milo maize	2,598	48,418
Dry edible beans	1,083	20,087
Potatoes	439	28,391

Hay and forage—	Acres	Tons
Timothy alone	225	305
Timothy and clover mixed	160	191
Clover alone	10	20
Alfalfa	4,242	14,472
Other tame and cultivated grasses	70	85
Wild, salt, or prairie grasses	568	552
Grains cut green	24,221	29,047
All other hay and forage	85	1,107
Total	29,581	45,779

Poultry products—	
Poultry raised, number	73,034
Eggs produced, dozen	249,229
Value poultry and eggs produced	$92,466
Honey and wax—	
Honey produced, pounds	67,689
Wax produced, pounds	798
Value of honey and wax produced	$5,790
Wool—	
Wool, fleeces shorn	73,221
Mohair and goat hair, fleeces shorn	4,009
Value wool and mohair produced	$56,620
Special crops—	
Potatoes, acres	439
Sweet potatoes, acres	6
All other vegetables, acres	160
Sugar beets, acres	211

Orchard fruits—	Number bearing trees
Apples	3,067
Apricots	4,420
Cherries	223
Peaches and nectarines	4,075
Pears	2,432
Prunes and plums	57,468
Total	71,796

Tropical fruits—	Number bearing trees
Figs	1,391
Lemons	199
Oranges	1,537
Pomeloes	70
Olives	336
Total	3,537

Grapevines—	
Number in bearing	482,417
Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	5
All others, acres	1
Total	7

Nuts—	Number bearing trees
Almonds	16,078
Pecans	10
Walnuts	1,306
Total	17,409

Irrigation.

Number of farms irrigated in 1909	112
Acres irrigated in 1909	4,276
Acreage enterprises were capable of irrigating in 1910	16,541
Acreage included in projects	18,783
Main ditches, number	38
Length, miles	44
Laterals, number	10
Length, miles	7
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$76,112
Average cost per acre irrigation enterprises were capable of irrigating in 1910	4.60

Mineral Production in 1915.

	Amount	Value
Mineral water, gallons	91,480	$15,003
Sandstone, cubic feet		1,000
Total		$16,003
Number of mineral springs		12

CONTRA COSTA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 714 square miles.	Population	13,515	18,046	31,674	------
County seat, Martinez (town).	Population	1,600	1,380	2,115	3,000

Population per square mile, 44.4.

Antioch (Station):

		Highest	Lowest		Inches		Inches
Elevation, 46 feet.	1916: Temperature	105	29	Rainfall	15.75	Snow	T

Contra Costa is one of the central counties, its shore line being within fourteen miles of San Francisco. It possesses unusually good traveling facilities both by rail and by steamer. The county has seventy miles of water front, nearly all of which is upon deep water, navigable by all vessels engaged in commerce. Over three-fourths of its area is cultivated, the balance being used for grazing. The only mountain of any size is Mount Diablo, which is 3,896 feet in height, and almost in the geographical center of the county.

The farming lands in the eastern section are between the foothills and the San Joaquin River. The soil is of a rich, alluvial nature, and produces wheat, barley, alfalfa, fruit, and vines. To the northward and between the uplands and the San Joaquin River is a body of the tule lands, a large portion of which has been reclaimed, and is some of the most productive land in the state, being a rich deposit of sediment and decomposed vegetation. Alfalfa, asparagus, potatoes, beans, etc., are produced on the largest scale on such lands.

Grain raising is very important in this county. A large acreage is planted to barley and hay. The raising of sugar beets is a growing industry. Vegetables of all kinds are raised profitably.

Stock raising is a leading industry, and the reclaimed lowlands for summer grazing and the rolling hills for winter, close together, create conditions whereby a failure is impossible. The stock farms have produced some of the most famous trotting and pacing horses. Port Costa, the shipping point for the bulk of the grain raised in California, has extensive warehouses. Near Vallejo Junction is the largest smelting works in the state; at Vallona are extensive lumber yards, where ships from Oregon and Puget Sound discharge; at Crockett are flouring mills, also the refinery of the California and Hawaiian Sugar Company. At Richmond one of the largest oil refining plants in the state is situated and during the last two years very extensive oil plants have been established at Martinez.

CONTRA COSTA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	18
3 to 9 acres	118
10 to 19 acres	127
20 to 49 acres	221
50 to 99 acres	158
100 to 174 acres	256
175 to 259 acres	147
260 to 499 acres	206
500 to 999 acres	140
1,000 acres and over	74
Total	1,465
Total in 1900	1,511

Land and Farm Areas.

Approximate land, acres	456,960
Land in farms in 1910	406,433
Land in farms in 1900	406,563
Improved land in farms in 1910	262,152
Improved land in farms in 1900	262,617
Woodland in farms	28,766
Other unimproved land	115,515

CONTRA COSTA COUNTY SUMMARY—Continued.

Value of all Farm Property.

Total in 1910	$31,812,192
Total in 1900	18,874,387
Per cent increase 1900-1910	68.5
Land in 1910	26,586,160
Land in 1900	15,553,110
Buildings in 1910	2,493,375
Buildings in 1900	1,675,790
Implements and machinery in 1910	680,520
Implements and machinery in 1900	404,590
Domestic animals, poultry and bees in 1910	2,052,137
Domestic animals, poultry and bees in 1900	1,240,897

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	9,469
Other cows	6,567
Yearling heifers	3,240
Calves	4,479
Yearling steers and bulls	1,123
Other steers and bulls	1,651
Total	26,529
Value	$647,877
Horses—	
Mature horses	9,494
Yearling colts	1,095
Spring colts	644
Total	11,233
Value	$1,136,119
Mules—	
Mature mules	564
Yearling colts	63
Spring colts	24
Total	651
Value	$78,810
Asses and burros—	
Number	6
Value	$4,265
Swine—	
Mature hogs	3,887
Spring pigs	3,054
Total	6,941
Value	$44,330
Sheep—	
Rams, ewes, and wethers	14,132
Spring lambs	5,463
Total	19,595
Value	$73,877
Goats—	
Number	17
Value	$76
Total value all domestic animals	$1,985,354
Poultry and bees—	
Poultry of all kinds	118,944
Value	$64,673
Colonies of bees	698
Value	$2,110

Principal Crops.

	Acres	Bushels
Corn	263	6,158
Oats	1,112	40,178
Wheat	2,443	53,332
Barley	18,665	731,970
Dry edible beans	2,156	61,498
Potatoes	12,687	2,226,695

Hay and forage—	Acres	Tons
Clover alone	839	1,874
Alfalfa	3,477	8,163
Other tame and cultivated grasses	3,825	4,901
Wild, salt, or prairie grasses	1,050	1,215
Grains cut green	79,368	112,478
All other hay and forage	378	449
Totals	88,937	129,080

Poultry products—	
Poultry raised, number	154,332
Eggs produced, dozen	664,951
Value poultry and eggs produced	247,618
Honey and wax—	
Honey produced, pounds	15,950
Wax produced, pounds	284
Value of honey and wax produced	1,382
Wool—	
Wool, fleeces shorn	14,715
Value wool and mohair produced	10,869
Special crops—	
Potatoes, acres	12,687
All other vegetables, acres	3,650
Sugar beets, acres	40

Orchard fruits—	Number bearing trees
Apples	13,429
Apricots	38,812
Cherries	7,258
Peaches and nectarines	39,461
Pears	68,088
Prunes and plums	58,177
Total	225,939

Tropical fruits—	Number bearing trees
Figs	293
Lemons	148
Oranges	402
Olives	9,744
Total	10,597
Grapevines—	
Number in bearing	2,972,130
Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	3
All others	2
Total	6

Nuts—	Number bearing trees
Almonds	209,056
Pecans	25
Walnuts	110,088
Total	215,249

Irrigation.

Number of farms irrigated in 1909	78
Acres irrigated in 1909	26,856
Acreage enterprises were capable of irrigating in 1910	32,562
Acreage included in projects	32,610
Main ditches, number	16
Length, miles	172
Flowing wells, number	1
Pumped wells, number	26
Cost of irrigation enterprises up to July 1, 1910	$90,503
Average cost per acre irrigation enterprises were capable of irrigating in 1910	2.78

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	14,915	$139,862
Limestone, tons	11,989	14,565
Stone, miscellaneous		397,330
Other minerals*		757,748
Total		$1,309,505

*Includes asbestos, cement and coal.

DEL NORTE COUNTY.

Date of creation, March 2, 1857.

Land area, 1,024 square miles
County seat, Crescent City.
Population per square mile, 2.4.

	1890	1900	1910	1915 (estimated)
Population	2,592	2,408	2,417	------
Population	907	699	1,114	1,200

Elevation, 125 feet. 1916: Temperature—Highest 93, Lowest 27. Rainfall—91.16 inches. Snow—13.5 inches.

Del Norte is the extreme northwestern county of California and has a coast line of about 35 miles. Crescent City, the county seat and principal harbor, is 280 miles from San Francisco.

Smith and Klamath are the principal streams, the former in the northern and the latter in the southern part of the county. Both are navigable near their mouths to the small ocean-going steamers. Dairying and lumbering are the principal industries. The mountains of the county prospect well in copper and gold-bearing formations.

Crescent City is the chief shipping point. Products usually are sent to the San Francisco market. The county is rich in undeveloped mineral resources.

Del Norte rivals Alpine County in regard to inaccessibility, transportation being by wagon and mule back, with one or two stage lines to Crescent City. Its chief mineral resources, largely untouched, are chromite, copper, gems, gold, graphite, iron, platinum and silver.

DEL NORTE COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	2
10 to 19 acres	6
20 to 49 acres	9
50 to 99 acres	13
100 to 174 acres	31
175 to 259 acres	11
260 to 499 acres	23
500 to 999 acres	10
1,000 acres and over	9
Total	114
Total in 1900	131

Land and Farm Areas.

Approximate land, acres	655,360
Land in farms in 1910	35,947
Land in farms in 1900	33,115
Improved land in farms in 1910	12,439
Improved land in farms in 1900	9,787
Woodland in farms	10,574
Other unimproved land	12,934

Value of all Farm Property.

Total in 1910	$1,770,222
Total in 1900	1,021,040
Per cent increase 1900-1910	73.4
Land in 1910	1,358,300
Land in 1900	687,830
Buildings in 1910	171,380
Buildings in 1900	121,840
Implements and machinery in 1910	48,265
Implements and machinery in 1900	35,130
Domestic animals, poultry and bees in 1910	192,277
Domestic animals, poultry and bees in 1900	176,240

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,575
Other cows	620
Yearling heifers	849
Calves	1,306
Yearling steers and bulls	273
Other steers and bulls	234
Total	6,857
Value	$137,380
Horses—	
Mature horses	382
Yearling colts	45
Spring colts	14
Total	441
Value	$37,265
Mules—	
Mature mules	3
Value	$475
Swine—	
Mature hogs	1,153
Spring pigs	617
Total	1,770
Value	$8,451
Sheep—	
Rams, ewes, and wethers	1,341
Spring lambs	500
Total	1,841
Value	$5,063

DEL NORTE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Goats—	
Number	465
Value	$1,245
Total value all domestic animals	$189,879

Poultry and bees—	
Poultry of all kinds	3,911
Value	$2,175
Colonies of bees	78
Value	$223

Principal Crops.

	Acres	Bushels
Corn	1	12
Oats	216	12,078
Barley	32	840
Dry edible beans	------	10
Potatoes	69	9,800

	Acres	Tons
Hay and forage—		
Timothy alone	6	11
Timothy and clover mixed	49	148
Clover alone	63	169
Alfalfa	33	90
Other tame and cultivated grasses	1,093	1,853
Wild, salt, or prairie grasses	50	50
Grains cut green	1,509	3,597
All other hay and forage	249	4,213
Totals	3,052	10,131

Poultry products—	
Poultry raised, number	3,357
Eggs produced, dozen	13,767
Value poultry and eggs produced	$4,651

Honey and wax—	
Honey produced, pounds	1,395
Value	$152

Wool—	
Wool, fleeces shorn	1,238
Mohair and goat hair, fleeces shorn	40
Value wool and mohair produced	$2,070

Special crops—	
Potatoes, acres	69
All other vegetables, acres	29

	Number bearing trees
Orchard fruits—	
Apples	3,234
Cherries	48
Peaches and nectarines	42
Pears	129
Prunes and plums	96
Total	3,549

	Number bearing trees
Tropical fruits—	
Figs	1

Small fruits—	
Strawberries, acres	1

	Number bearing trees
Nuts—	
Pecans	3
Walnuts	3
Total	6

Mineral Production in 1915.

Substance	Value
Gold	$1,018
Silver	6
Stone, miscellaneous	3,500
Total	$4,524

EL DORADO COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 1,753 square miles.	Population	9.232	8,986	7,492	------
County seat, Placerville.	Population	1.690	1,748	1,914	2,150
Population per square mile, 4.3.					

	Highest	Lowest		Inches		Inches
Elevation, 1,875 feet. 1916: Temperature	100	14	Rainfall	45.27	Snow	34.0

El Dorado County is situated on the western slope of the Sierra Nevada Mountains, in the eastern portion of the state. The county is about 75 miles long and about 30 miles in width. The western portion of the county borders the Sacramento Valley, and is used principally for grazing, stock raising, also grape and fruit growing. The central portion of the county includes the great mineral belt, known as the "Mother Lode," from which millions of dollars have been extracted on and near the surface in its infancy. In this belt, which is chiefly foothills, can be found some of the best fruit lands in the state.

The eastern portion, being at an altitude of from 3,000 to 7,000 feet, supplies summer pasturage for a number of cattle, sheep, and horses. In this region water is abundant, awaiting capital and labor to harness the everflowing streams. Most of this area is covered by a virgin growth of sugar and white pine, fir, and cedar timber.

(*Information supplied by the Chamber of Commerce.*)

While fruit growing has been found to be more profitable here than in most parts of the state, potatoes are now attracting much attention. There will probably be twenty thousand sacks or over raised in the vicinity of Placerville during this season. They are beautiful, smooth skinned, perfectly shaped, and, on account of the high, dry altitude, are extremely mealy.

During the season of 1914, 300 cars of deciduous fruit were shipped, of which 250 went to Eastern cities and 50 to local California markets. The average price obtained on Bartlett pears was close to $1.35 per box, f. o. b. Placerville.

During 1915, on account of the low prevailing prices on peaches in the Eastern markets, much of these were shipped to San Francisco and Oakland, thus reducing the shipments to Eastern points to about 130 cars, comprised mostly of pears and plums. Bartlett pears averaged during 1915 about $1.50 f. o. b. shipping point.

Several hundred acres of young pear trees have been planted in the last five years and in another year or two the output of Bartlett pears will have been doubled and in four years from now that figure will probably be again doubled. In 1916, 179 cars of deciduous fruits were shipped east.

Bartlett pears averaged two dollars per box f.o.b. loading point. Over fifty cars of fruit were shipped to San Francisco and Oakland.

EL DORADO COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	26
10 to 19 acres	21
20 to 49 acres	60
50 to 99 acres	88
100 to 174 acres	212
175 to 259 acres	100
260 to 499 acres	122
500 to 999 acres	52
1,000 acres and over	35
Total	716
Total in 1900	759

Land and Farm Areas.

Approximate land, acres	1,121,920
Land in farms in 1910	210,881
Land in farms in 1900	209,320
Improved land in farms in 1910	41,682
Improved land in farms in 1900	45,481
Woodland in farms	137,057
Other unimproved land	32,142

Value of all Farm Property.

Total in 1910	$3,775,358
Total in 1900	2,590,574
Per cent increase 1900-1910	45.7
Land in 1910	2,343,931
Land in 1900	1,546,240
Buildings in 1910	749,745
Buildings in 1900	566,120
Implements and machinery in 1910	162,185
Implements and machinery in 1900	116,320
Domestic animals, poultry, and bees in 1910	519,497
Domestic animals, poultry, and bees in 1900	361,894

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,823
Other cows	4,338
Yearling heifers	1,683
Calves	2,154
Yearling steers and bulls	1,138
Other steers and bulls	912
Total	13,048
Value	$254,098
Horses—	
Mature horses	2,274
Yearling colts	180
Spring colts	90
Total	2,544
Value	$202,610
Mules—	
Mature mules	93
Yearling colts	9
Spring colts	10
Total	112
Value	$10,130
Asses and burros—	
Number	17
Value	$2,985
Swine—	
Mature hogs	1,428
Spring pigs	973
Total	2,401
Value	$16,502
Sheep—	
Rams, ewes and wethers	1,763
Spring lambs	1,399
Total	3,162
Value	$11,580
Goats—	
Number	3,315
Value	$7,136
Total value all domestic animals	$189,879
Poultry and bees—	
Poultry of all kinds	24,308
Value	$12,667
Colonies of bees	464
Value	$1,079

Principal Crops.

	Acres	Bushels
Corn	38	768
Oats	543	10,504
Wheat	193	3,201
Barley	50	884
Potatoes	113	18,513

Hay and forage—	Acres	Tons
Timothy alone	13	14
Timothy and clover mixed	443	466
Clover alone	234	493
Alfalfa	407	824
Other tame and cultivated grasses	447	508
Wild, salt, or prairie grasses	2,535	2,191
Grains cut green	7,989	7,142
All other hay and forage	47	47
Totals	12,115	11,685

Poultry products—	
Poultry raised, number	28,499
Eggs produced, dozen	132,910
Value poultry and eggs produced	$45,411
Honey and wax—	
Honey produced, pounds	8,105
Wax produced, pounds	75
Value of honey and wax produced	$696
Wool—	
Wool, fleeces shorn	3,808
Mohair and goat hair, fleeces shorn	933
Value wool and mohair produced	$3,504
Special crops—	
Potatoes, acres	113
All other vegetables, acres	197

Orchard fruits—	Number bearing trees
Apples	31,929
Apricots	3,061
Cherries	3,259
Peaches and nectarines	61,800
Pears	49,672
Prunes and plums	32,764
Total	180,017

EL DORADO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Tropical fruits—	Number bearing trees
Figs	587
Oranges	53
Olives	37
Total	677

Grapevines—	
Number in bearing	581,342

Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	11
All others, acres	7
Total, acres	23

Nuts—	Number bearing trees
Almonds	438
Walnuts	880
Total	1,318

Irrigation.

Number of farms irrigated in 1909	244
Acres irrigated in 1909	5,122
Acreage enterprises were capable of irrigating in 1910	5,501
Acreage included in projects	20,264
Main ditches, number	56
Length, miles	285
Laterals, number	25
Length, miles	55
Cost of irrigation enterprises up to July 1, 1910	$346,939
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$63.07

Mineral Production in 1915.

Substance	Amount	Value
Copper, pounds	417	$73
Gold	-----	401,288
Lime, barrels	15,911	12,872
Silver	-----	1,353
Stone, miscellaneous	-----	7,500
Other minerals*	-----	5,250
Total	-----	$428,336

*Includes slate and soapstone.

FRESNO COUNTY.

Date of creation, April 19, 1856.

		1890	1900	1910	1916 (estimated)
Land area, 5,950 square miles.	Population	32,025	37,862	75,657	------
County seat, Fresno (city).	Population	10,818	12,470	24,892	34,958
Population per square mile, 12.7.					

		Highest	Lowest		Inches		Inches
Elevation, 293 feet. 1916:	Temperature	108	28	Rainfall	12.50	Snow	0.9

Including vineyards, Fresno County is the greatest fruit and wine producer. It is situated in the center of the state and in the middle of the fertile San Joaquin Valley. There are only five counties which exceed Fresno in size—San Bernardino, Inyo, Kern, Riverside, and Siskiyou, in the order named. When Fresno was first formed it was considerably larger, but on the eleventh of March, 1893, a large slice, consisting of 2,121 square miles, was carved out of the northern part of the county and formed into Madera County; and still more recently, Fresno County was again mutilated by 202 square miles of the southeast portion being transferred to Kings County by an act of the legislature approved April 12, 1909. Before being partitioned, Fresno County comprised 8,214 square miles, but although the land area has been thus reduced to 5,950 square miles, the county ranks sixth of the fifty-eight in the state, and is one of the most productive. It is also the fifth largest in population, being only exceeded by San Francisco, Los Angeles, Alameda and Santa Clara. The word ''Fresno,'' in Spanish, signifies ash tree, and it was because of the abundance of mountain ash in the mountains of this county that it received its name.

Fresno County is naturally subdivided into two portions—plains and mountains. The plains are the bottom of the San Joaquin Valley, extending from the foot of the Coast Range on the west to the foothills of the Sierra Nevadas on the east. From the first foothills the rise is rapid, the mountains culminating in peaks rising 10,000 to 12,000 feet high. The country about Fresno is a vast plain intersected by the San Joaquin and Kings rivers and their tributaries. Four natural soil divisions have been recognized—the foothill region, where agriculture was formerly confined to grazing; the plains of the valley, with red soils lying near the hills; the ''white ash'' soil found farther out in the plain, and the bottoms, or alluvial lands, along the Kings River.

There is a dry and a wet season, the former from about May to September, and the latter from the middle of October or early part of November. The rains, which are at irregular intervals during the winter, seldom last more than two or three days at a time. There are about 238 days of sunshine in the year. The atmosphere during the summer months is dry, and the heat not nearly so oppressive as in the East and other places where the humidity is great. Sunstroke is unknown.

The county has passed through four stages of development. First came mining in the early days before it was organized as a county, and this period extended to about 1860–64. Secondly, came the stock-raising period, which arose from the gradual disappearance of placer mining, and lasted until 1874, although sheep raising still continued on a large scale; thirdly, about 1868, the farming interests sprang up although prior to the advent of the railroad in 1870, agriculture amounted to very little. The fourth, and most important, may be called the viticultural and fruit era, which began to come into prominence early in the eighties, and has now become the leading feature of the county.

As California holds the first place among all the states in the Union in irrigation, so Fresno is the leading county in the state, both in number and extent of its canals and ditches, having more than double the acreage under irrigation than has any other county.

During the last ten years, the dairy industry has made great progress, except in the manufacture of cheese, which, however, was never produced on a very large scale.

Including grapes, Fresno produces more fruit than any other county in the state. Fresno County holds the first place in the production of grapes, raisins, figs, sweet wines, and brandy, and is one of the leading counties of the state in the production of peaches, apricots, and olives, and the acreage in citrus fruits is rapidly increasing.

Fresno is one of the largest producers of olive oil and pickled olives in the state, both being of a very high grade.

In figs, the county has been a large producer for many years, and is noted for the now well-known Smyrna, or "Calimyrna" figs, which were first introduced into this state by George C. Roeding, of Fresno. The quantity now packed in Fresno amounts to several thousand tons per annum.

Since 1884, when the White Adriatic was introduced into the county, the cultivation of figs has become an important industry. It is estimated that the total pack amounts to nearly 5,000 tons, of which about 3,800 tons are White Adriatic, 400 tons of Smyrna, and 100 tons of Black Mission figs.

A large area, amounting to several thousand acres, has recently been planted near Fresno by the Fresno Suburban Homes Company.

The varieties of fish include salmon, black bass, trout, and catfish, all of which are plentiful.

There is an abundance of game, including quail, doves, a large variety of ducks and wild geese, but there is no means at present of ascertaining either the quantity or money value of either fish or game. The sums received for hunting licenses, however, are considerable.

The value of the lumber industry to the county is very large, varying from sixty to seventy-five million feet, board measure, with an average value of some two million dollars a year, comprising sugar pine, white pine, fir, and sequoia.

The great increase in the manufactures of Fresno is due chiefly to the increase in the canning and preserving of fruits and vegetables, the value of products for which amounted to $6,942,440, and formed 70.5 per cent of the total value of all the manufacturing industries of the city. In 1909 the total value of all products amounted to $11,090,000 and in 1914 to $16,520,000, or an increase in five years of 49 per cent. Most of the fruit preserving of Fresno is by the drying or evaporating process, and the greatest crop is in raisins, in which Fresno leads the world.

In recent years the production of petroleum in Fresno County has developed from a small beginning into one of the most important industries. In 1900 the wells in the county at Coalinga produced 532,000 barrels of the value of about $547,960; in 1914 the production was

18,956,965 barrels valued at $7,927,736. The county ranks third in the state in the value of minerals produced, the total in 1915 being $8,152,300.*

FRESNO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	267
10 to 19 acres	598
20 to 49 acres	3,240
50 to 99 acres	951
100 to 174 acres	609
175 to 259 acres	142
260 to 499 acres	202
500 to 999 acres	119
1,000 acres and over	111
Total	6,245
Total in 1900	3,290

Land and Farm Areas.

Approximate land, acres	3,808,000
Land in farms in 1910	1,106,616
Land in farms in 1900	1,284,736
Improved land in farms in 1910	590,205
Improved land in farms in 1900	786,337
Woodland in farms	93,194
Other unimproved land	423,217

Value of all Farm Property.

Total value in 1910	$92,583,058
Total value in 1900	42,829,479
Per cent increase 1900-1910	†
Land in 1910	75,136,654
Land in 1900	34,201,530
Buildings in 1910	6,861,289
Buildings in 1900	3,092,140
Implements and machinery in 1910	3,228,706
Implements and machinery in 1900	1,593,890
Domestic animals, poultry, and bees in 1910	7,356,409
Domestic animals, poultry, and bees in 1900	3,941,919

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	22,241
Other cows	42,001
Yearling heifers	13,117
Calves	12,682
Yearling steers and bulls	15,354
Other steers and bulls	22,230
Total	127,625
Value	$3,258,420
Horses—	
Mature horses	22,063
Yearling colts	1,899
Spring colts	1,047
Total	25,009
Value	$2,583,216
Mules—	
Mature mules	3,498
Yearling colts	298
Spring colts	183
Total	3,979
Value	$534,660
Asses and burros—	
Number	101
Value	$34,883
Swine—	
Mature hogs	20,134
Spring pigs	13,016
Total	33,150
Value	$230,325
Sheep—	
Rams, ewes, and wethers	94,757
Spring lambs	47,254
Total	142,011
Value	$555,057
Goats—	
Number	4,558
Value	$8,485
Total value all domestic animals	$7,205,046
Poultry and bees—	
Poultry of all kinds	213,108
Value	$116,504
Colonies of bees	9,242
Value	$34,859

Principal Crops.

	Acres	Bushels
Corn	1,422	37,726
Oats	1,554	20,027
Wheat	7,829	97,391
Barley	32,132	694,234
Kafir corn and milo maize	1,689	37,506
Dry edible beans	9	155
Potatoes	218	23,891

	Acres	Tons
Hay and forage—		
Timothy and clover mixed	3	6
Clover alone	10	62
Alfalfa	47,776	167,217
Other tame and cultivated grasses	243	208
Wild, salt, or prairie grasses	2,741	2,343
Grains cut green	44,159	43,863
All other hay and forage	333	960
Totals	95,265	214,659

Poultry products—	
Poultry raised, number	266,221
Eggs produced, dozen	1,267,840
Value of poultry and eggs produced	$419,265
Honey and wax—	
Honey produced, pounds	616,609
Wax produced, pounds	7,261
Value of honey and wax produced	$33,356
Wool—	
Wool, fleeces shorn	107,802
Mohair and goat hair, fleeces shorn	1,900
Value of wool and mohair produced	$109,982

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*For details regarding petroleum, see Part VIII.

†In comparing the data secured in 1910 with that for 1900, it should be remembered that a part of the county was transferred to Kings County in 1909.

FRESNO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Special crops—	
Potatoes, acres	218
Sweet potatoes, acres	57
All other vegetables, acres	1,391
Sugar beets, acres	228

Orchard fruits—	Number bearing trees
Apples	32,097
Apricots	186,823
Cherries	2,729
Peaches and nectarines	2,277,314
Pears	13,356
Prunes and plums	66,926
Total	2,579,859

Tropical fruits—	Number bearing trees
Figs	120,124
Lemons	12,389
Oranges	85,781
Pomeloes	346
Olives	72,788
Total	291,754

Grapevines—	
Number in bearing	40,687,207

Small fruits—	
Strawberries, acres	148
Blackberries and dewberries, acres	91
All others, acres	71
Total acres	310

Nuts—	Number bearing trees
Almonds	7,390
Pecans	56
Walnuts	634
Total	8,203

Irrigation.

Number of farms irrigated in 1909	5,310
Acres irrigated in 1909	402,318
Acreage enterprises were capable of irrigating in 1910	560,326
Acreage included in projects	633,652
Main ditches, number	254
Length, miles	831
Laterals, number	688
Length, miles	1,354
Flowing wells, number	3
Pumped wells, number	855
Cost of irrigation enterprises up to July 1, 1910	$1,898,460
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$3.39

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	4,750	$33,250
Chrome, tons	1,300	13,600
Copper, pounds	65,903	11,533
Gold	----	4,151
Natural gas, M cu. ft.	2,894,834	253,906
Petroleum, barrels	14,021,025	7,641,459
Silver	--------	246
Stone, miscellaneous	--------	193,705
Other minerals	--------	450
Total	--------	$8,152,300

GLENN COUNTY.

Date of creation, March 11, 1891.

Land area, 1,259 square miles.
County seat, Willows (town).
Population per square mile, 5.7.

	1890	1900	1910	1915 (estimated)
Population	-----	5,150	7,172	------
Population	1,176	893	1,139	3,000

Elevation, 136 feet.

1916:	Highest	Lowest		Inches		Inches
Temperature	111	24	Rainfall	17.41	Snow	14.0

Glen County occupies a central position in the Sacramento Valley, extending from the summit of the Coast Range across the Sacramento eastward, one-third being mountainous, but affording good summer pasturage for stock. About the same area is in the foothills, with many fertile ranches, and the remaining third practically a level valley floor of wonderfully fertile soil, which has for the past forty years been continuously cropped to grain and still continues to produce good crops.

The United States Reclamation Service has installed a system to irrigate 14,000 acres of the fertile lands about the town of Orland. This project is designed as a model irrigation system, and was undertaken by the reclamation service to demonstrate the benefits of irrigation under perfect conditions of soil and climate. The works consist of an impounding dam, situated at East Park in Colusa County, a diversion dam at the Buttes in Tehama County, and 99 miles of canals and main laterals, about 100 miles of small field ditches.

Owing to the extensive system of grain farming, and the very limited number of small irrigated farms, the average farm in Glenn County up to recent years was large. Within the last few years a considerable acreage in rice has been grown.

The county roads are excellent. They are graded, graveled, and kept in splendid condition, the gravel in all parts of the county being particularly adapted to road making.

Glenn County is the hunter's paradise. Black bass, striped bass, salmon, perch, catfish, trout, and many other varieties abound in the Sacramento River, and the mountain streams are full of speckled trout, while the heavy growth of brush along the river banks and in the foothills is full of quail, deer, squirrels, and other game, whereas from the middle of November to the first of March, when the wild geese and ducks come into winter quarters, good sport is enjoyed, the hunters killing them by the hundreds.

GLENN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	----------
3 to 9 acres	40
10 to 19 acres	33
20 to 49 acres	106
50 to 99 acres	65
100 to 174 acres	79
175 to 259 acres	31
260 to 499 acres	101
500 to 999 acres	89
1,000 acres and over	119
Total	663
Total in 1900	529

Land and Farm Areas.

Approximate land, acres	805,760
Land in farms in 1910	491,198
Land in farms in 1900	577,363
Improved land in farms in 1910	309,765
Improved land in farms in 1900	355,781
Woodland in farms	67,665
Other unimproved land	113,768

Value of all Farm Property.

Total value in 1910	$16,581,419
Total value in 1900	10,299,300
Per cent increase 1900-1910	61.0
Land in 1910	13,425,220
Land in 1900	8,473,830
Buildings in 1910	1,110,215
Buildings in 1900	719,510

GLENN COUNTY SUMMARY—Continued.

Value of All Farm Property—Continued.

Implements and machinery in 1910	$390,333
Implements and machinery in 1900	299,620
Domestic animals, poultry, and bees in 1910	1,655,651
Domestic animals, poultry, and bees in 1900	806,340

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	3,688
Other cows	3,601
Yearling heifers	1,410
Calves	2,409
Yearling steers and bulls	1,925
Other steers and bulls	2,051
Total	16,214
Value	*$365,093
Horses—	
Mature horses	3,319
Yearling colts	339
Spring colts	262
Total	3,946
Value	$357,207
Mules—	
Mature mules	3,033
Yearling colts	207
Spring colts	122
Total	3,362
Value	$407,327
Asses and burros—	
Number	29
Value	$17,625
Swine—	
Mature hogs	12,483
Spring pigs	5,827
Total	18,310
Value	$106,475
Sheep—	
Rams, ewes, and wethers	70,210
Spring lambs	41,153
Total	111.363
Value	$363,893
Goats—	
Number	2,813
Value	$5,976
Total value all domestic animals	$1,623,596
Poultry and bees—	
Poultry of all kinds	50,336
Value	$30,715
Colonies of bees	420
Value	$1,340

Principal Crops.

	Acres	Bushels
Corn	671	21.999
Oats	1,283	32,620
Wheat	17,541	232.911
Barley	53,513	1,002,587
Kafir corn and milo maize	162	4,972
Potatoes	24	1,435
Hay and forage—	Acres	Tons
Timothy alone	6	8
Timothy and clover mixed	18	22
Clover alone	5	4
Alfalfa	3,211	10,848
Other tame and cultivated grasses	799	1,045
Wild, salt, or prairie grasses	265	198
Grains cut green	20,824	25,332
All other hay and forage	15	137
Totals	25,143	37,594

Poultry products—	
Poultry raised, number	67,529
Eggs produced, dozen	252,286
Value poultry and eggs produced	$110,010
Honey and wax—	
Honey produced, pounds	10,982
Wax produced, pounds	250
Value of honey and wax produced	$1,194
Wool—	
Wool, fleeces shorn	131,612
Mohair and goat hair, fleeces shorn	5,177
Value wool and mohair produced	$101,749
Special crops—	
Potatoes, acres	24
Sweet potatoes, acres	1
All other vegetables, acres	115
Sugar beets, acres	1,264
Orchard fruits—	Number bearing trees
Apples	4,617
Apricots	6,830
Cherries	78
Peaches and nectarines	6,420
Pears	1,655
Prunes and plums	24,860
Total	44,565
Tropical fruits—	Number bearing trees
Figs	879
Lemons	593
Oranges	4,860
Pomeloes	5
Olives	445
Total	6,783
Grapevines—	
Number in bearing	20,416
Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	4
All others, acres	2
Total	8
Nuts—	Number bearing trees
Almonds	25,739
Pecans	15
Walnuts	220
Total	26,336

Irrigation.

Number of farms irrigated in 1909	196
Acres irrigated in 1909	5,661
Acreage enterprises were capable of irrigating in 1910	16,804
Acreage included in projects	220,664
Main ditches, number	50
Length, miles	136
Laterals, number	554
Length, miles	1,073
Pumped wells, number	105
Cost of irrigation enterprises up to July 1, 1910	$1,519,561
Average cost per acre irrigation enterprises were capable of irrigating in 1910	90.43

Mineral Production in 1915.

Substance	Amount	Value
Copper, pounds	746	$131
Stone, miscellaneous	-----	46,526
Other minerals	-----	10
Total	-----	$46,667

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*Includes animals, age and sex not specified.

HUMBOLDT COUNTY.

Date of creation, May 2, 1853.

		1890	1900	1910	1916 (estimated)
Land area, 3,634 square miles.	Population	23,469	27,101	33,857	------
County seat, Eureka.	Population	4,858	7,327	11,845	14,684
Population per square mile, 9.3.					

		Highest	Lowest		Inches		Inches
Elevation, 64 feet.	1916: Temperature	75	31	Rainfall	37.95	Snow	1.4

Humboldt County has long laid virtually undisturbed in the northwestern part of California. There is no section in the state today where natural resources give so great an opportunity for development.

While the greater portion of the county's surface is hilly, there is considerable level land around Humboldt Bay and along the numerous rivers which flow down from the mountains to the ocean. All of this land, both hill and dale, is very fertile and productive, and is principally utilized for farming, dairying, and fruit raising. The fact has been well established that here can be raised as good fruit of all kinds as in the state. Fruit grown here is nearly altogether free from insect pests; the codling moth, which is so ruinous to the apple business in a great many localities, has not yet gained a foothold here. For the last fifteen years an average of 57,000 boxes of choice apples has been shipped from the county each year.

A great variety of berries grows in profusion in all parts where cultivated, and wild blackberries, huckleberries, and strawberries grow in almost every section of the county. The wild blackberry is especially abundant and of the finest flavor.

There are abundant streams and springs throughout the county, which furnish plenty of pure water to its inhabitants the year round and render irrigation absolutely unnecessary.

Humboldt stands third among the counties of the state in the production of butter and cheese.

Lumbering is the chief industry of the county; the output of the lumber and shingle mills, and sash and door factories is greater than that of any other county in the state, and also contains more standing redwood timber than any other county.

Stock raising is carried on extensively throughout the county, and is one of its most important industries. Gold mining is carried on to some extent along the Klamath and Trinity rivers. Commercial fishing is also an important industry.

The railway from San Francisco has recently been extended through the county to Eureka and on to Trinidad, which will greatly help its development.

(*Information supplied by the Chamber of Commerce.*)

Eureka, the county seat and principal city, had an estimated population of 15,000 on June 30, 1915. Its principal industries are commerce and shipping, lumber manufacture, ship building, and general trade.

Arcata, the town next in size, had an estimated population of 2,000 on January 1, 1915. It depends chiefly upon the farming and dairying region surrounding it. Has a barrel stave factory, a tannery, and minor manufactures. Has the Humboldt State Normal School.

Ferndale, estimated population 1,600, is in the heart of the Eel River dairying section. Farming and dairying are the leading industries. Has dry milk plant.

Fortuna, estimated population 1,600, also in the Eel River Valley, depends upon farming, dairying, and lumber manufacturing.

Blue Lake, population 700, in the Mad River farming district, depends upon farming and dairying.

Loleta, population 600, depends upon dairying and farming. Has a condensed milk plant.

Fields Landing, population 400, depends upon shipping and has the workshops of the Northern Pacific Railroad Company.

Scotia, 1,300; Samoa, 1,000, and Korbel, 700, are each sawmill towns, depending almost wholly upon lumber manufacturing.

HUMBOLDT COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	10
3 to 9 acres	78
10 to 19 acres	107
20 to 49 acres	280
50 to 99 acres	245
100 to 174 acres	334
175 to 259 acres	118
260 to 499 acres	147
500 to 999 acres	84
1,000 acres and over	131
Total	1,534
Total in 1900	1,500

Land and Farm Areas.

Approximate land, acres	2,325,760
Land in farms in 1910	642,536
Land in farms in 1900	648,511
Improved land in farms in 1910	105,248
Improved land in farms in 1900	77,238
Woodland in farms	174,354
Other unimproved land	362,934

Value of all Farm Property.

Total value in 1910	$21,230,881
Total value in 1900	13,241,799
Per cent increase 1900-1910	60.3
Land in 1910	16,378,032
Land in 1900	9,524,850
Buildings in 1910	2,054,525
Buildings in 1900	1,282,880
Implements and machinery in 1910	444,280
Implements and machinery in 1900	311,020
Domestic animals, poultry, and bees in 1910	2,354,044
Domestic animals, poultry, and bees in 1900	2,123,049

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	21,572
Other cows	7,837
Yearling heifers	5,531
Calves	8,334
Yearling steers and bulls	3,413
Other steers and bulls	6,590
Total	53,277
Value	*$1,363,050
Horses—	
Mature horses	5,851
Yearling colts	421
Spring colts	131
Total	6,403
Value	$591,639
Mules—	
Mature mules	189
Value	$13,940
Asses and burros—	
Number	11
Value	$350
Swine—	
Mature hogs	7,688
Spring pigs	4,945
Total	12,633
Value	$58,457
Sheep—	
Rams, ewes, and wethers	62,423
Spring lambs	24,650
Totals	87,073
Value	$278,763
Goats—	
Number	3,747
Value	$12,477
Total value all domestic animals	$2,318,676
Poultry and bees—	
Poultry of all kinds	54,834
Value	$30,037
Colonies of bees	1,803
Value	$5,331

Principal Crops.

	Acres	Bushels
Corn	253	7,633
Oats	2,823	75,803
Wheat	134	3,370
Barley	1,296	65,991
Dry edible beans	18	392
Potatoes	1,108	156,437

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*Includes animals, age and sex not specified.

HUMBOLDT COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Hay and forage—	Acres	Tons
Timothy alone	174	194
Timothy and clover mixed	109	363
Clover alone	2,459	6,479
Alfalfa	974	3,287
Other tame and cultivated grasses	4,065	9,707
Wild, salt, or prairie grasses	901	1,368
Grains cut green	18,773	35,805
All other hay and forage	2,563	62,410
Totals	30,018	119,613

Poultry products—	
Poultry raised, number	67,310
Eggs produced, dozen	332,115
Value poultry and eggs produced	$115,116

Honey and wax—	
Honey produced, pounds	23,481
Wax produced, pounds	367
Value of honey and wax produced	$2,602

Wool—	
Wool, fleeces shorn	85,212
Mohair and goat hair, fleeces shorn	2,540
Value of wool and mohair produced	$104,430

Special crops—	
Potatoes, acres	1,108
All other vegetables, acres	675

Orchard fruits—	Number bearing trees
Apples	73,010
Apricots	235
Cherries	3,733
Peaches and nectarines	9,471
Pears	3,804
Prunes and plums	26,950
Total	117,203

Tropical fruits—	Number bearing trees
Figs	82
Oranges	1
Total	83

Grapevines—	
Number in bearing	4,095

Small fruits—	
Strawberries, acres	58
Blackberries and dewberries	4
All others	25
Total	87

Nuts—	Number bearing trees
Almonds	304
Walnuts	498
Total	802

Irrigation.

Number of farms irrigated in 1909	33
Acres irrigated in 1909	208
Acreage enterprises were capable of irrigating in 1910	333
Acreage included in projects	966
Main ditches, number	33
Length, miles	26
Laterals, number	4
Length, miles	2
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$29,027
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$87.17

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	463	$5,565
Gold	-----	15,947
Mineral water, gallons	2,000	500
Silver	-----	62
Stone, miscellaneous	-----	335,292
Other minerals†	-----	1,320
Total	-----	$358,686

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†Includes copper and natural gas.

IMPERIAL COUNTY.

Date of creation, August 15, 1907.

(Organized from part of San Diego County.)

		1890	1900	1910	1915 (estimated)
Land area, 4,089 square miles.	Population	-----	-----	13,591	------
County seat, El Centro (city).	Population	-----	-----	1,610	6,000
Population per square mile, 3.3.					

Calexico (Station):		Highest	Lowest		Inches		Inches
Elevation, 0 feet.	1916: Temperature	116	25	Rainfall	4.44	Snow	0

Imperial is the youngest county in the state, having been formed in 1907, from the eastern part of San Diego County, formerly known as the "Colorado Desert, or Imperial Valley." The progress of the county is practically confined to the central part of the valley.

Dairying is very profitable, owing to the fact that alfalfa grows throughout the winter, furnishing an abundant supply of green pasturage. Modern creameries, with latest appliances, are located in different sections. In the production of butter the county ranks second, the output being only exceeded by Stanislaus County.

Imperial Valley is one of the best stock, hog, and poultry-producing counties.

The cultivation of cotton holds a most important part in the industrial development of Imperial County.*

Imperial Valley is 110 miles long by 40 miles wide, half in California, half in Mexico. The present irrigated area is 40 by 25 miles in California. Irrigated from the Colorado River, from which 50,000 miner's inches are available. The surface appears to be perfectly level, but slopes gradually northward, affording a sufficient fall for the waters of the irrigation system.

At Brawley there is a large ostrich farm containing some 1,300 birds.

At El Centro, a plant has been established for the manufacture of cottonseed oil, and cottonseed cake on which a large number of cattle are fattened.

(*Information supplied by the Development Agent, El Centro.*)

Imperial County corners off the state of California on the southeast. Over 90 per cent of its population is represented in the Imperial Valley, which in 16 years has been reclaimed from a desert waste and developed until the population today is 45,000, where before there was none, and has an actual property valuation of $90,000,000, where before was worthlessness. It is sometimes referred to as "Barbara Worth's country," being the locale of a novel of similar name.

The present year finds the greatest expansion in the history of the fast-growing valley. Between 90,000 and 100,000 acres have been put in crop for the first time, according to water company reports. Of these, 30,000 are by American planters on the Mexican side of the line, making the acreage in crop there 65,000.

The greatest single crop expansion is in cotton, the acreage in 1916 being 55,000 as compared with 35,000 in 1915. Forty per cent of this is in long staple cotton. An early summer estimate of the value of the cotton crop in Imperial Valley was $7,500,000.

Almost as great an acreage is in barley, or approximately 105,000, half of which is cut for hay and the balance for grain. The barley land is generally used for corn the second half of the year.

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*For details regarding the cotton crop, see pages 77-79.

Another hundred thousand acres in the valley is in alfalfa and is the basis of its live-stock farming. Records of the State Dairy Bureau show Imperial as the second butter-producing county in the state, and that its production of 6,334,316 pounds in 1915 is four times as much as that of the other southern California counties combined. By contract of the government with one of the creameries operating in the valley, Imperial Valley butter is now being used in supplying the Atlantic squadron.

Imperial Valley is the chief meat supply of southern California, marketing 40,000 head of beef cattle, 35,000 hogs and about 20,000 sheep each year. Cattle brought from ranges as far east as Texas and as far north as Idaho are fattened on valley grass, which grows through the winter.

The chief fruits of the valley are grapefruit, grapes, apricots and melons. It is the largest cantaloupe county in America, shipping 5,000 cars yearly. Besides large yields, its fruits and vegetables are earliest in the market. Ninety thousand dollars in asparagus was shipped from the valley this spring, the first shipment going forward February 8. Green peas were shipped into New York in carload lots this spring for the first time, selling for $2,500 and netting the grower $1,917.50, according to the Wells Fargo Company. Lettuce was shipped East for the first time in carloads.

Imperial Valley vies with Kansas in turkey production. Its crop is worth $250,000 a year. According to the Southern Pacific Company, 47 cars of honey were shipped out of the valley in 1915. The estimate placed on the total agricultural production of the valley for 1916 is $20,000,000.

The irrigation system which supplies the valley with water from the Colorado River is the largest unit project in the United States and is operated by the people of the valley themselves. Approximately 500,000 acres are in cultivation in the valley. The chief engineer of the system says the present supply of water is safe for 1,200,000 acres and that with the construction of one or two reservoirs, which will store 2,000,000 acre-feet of water, the supply will be adequate for every acre of land susceptible of irrigation from the Colorado River.

IMPERIAL COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	51
3 to 9 acres	46
10 to 19 acres	56
20 to 49 acres	182
50 to 99 acres	227
100 to 174 acres	400
175 to 259 acres	98
260 to 499 acres	201
500 to 999 acres	51
1,000 acres and over	10
Total	1,322
Total in 1900	†

Land and Farm Areas.

Approximate land, acres	2,616,960
Land in farms in 1910	223,662
Land in farms in 1900	†
Improved land in farms in 1910	176,069
Improved land in farms in 1900	†
Woodland in farms	1,138
Other unimproved farms	46,395

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†Organized from San Diego County August 15, 1907.

IMPERIAL COUNTY SUMMARY—Continued.

Value of all Farm Property.

Total value in 1910	$23,646,067
Total value in 1900	†
Per cent increase 1900-1910	†
Land in 1910	19,832,660
Land in 1900	†
Buildings in 1910	764,665
Buildings in 1900	†
Implements and machinery in 1910	459,535
Implements and machinery in 1900	†
Domestic animals, poultry and bees in 1910	2,589,207
Domestic animals, poultry and bees in 1900	†

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	9,653
Other cows	2,728
Yearling heifers	2,560
Calves	2,772
Yearling steers and bulls	1,379
Other steers and bulls	1,817
Total	*22,741
Value	*$865,001
Horses—	
Mature horses	6,277
Yearling colts	580
Spring colts	372
Total	7,229
Value	$798,317
Mules—	
Mature mules	1,583
Yearling colts	69
Spring colts	20
Total	1,672
Value	$233,196
Asses and burros—	
Number	56
Value	$1,569
Swine—	
Mature hogs	45,764
Spring pigs	24,798
Total	70,562
Value	$503,164
Sheep—	
Rams, ewes and wethers	13,786
Spring lambs	9,553
Total	23,339
Value	$108,504
Goats—	
Number	147
Value	$463
Total value all domestic animals	$2,510,214
Poultry and bees—	
Poultry of all kinds	72,252
Value	$54,117
Colonies of bees	4,740
Value	$24,876

Principal Crops.

	Acres	Bushels
Corn	690	14,419
Oats	30	372
Wheat	125	2,559
Barley	36,986	908,916
Kafir corn and milo maize	9,789	213,781
Potatoes	60	3,347

Hay and forage—	Acres	Tons
Alfalfa	30,847	72,201
Other tame and cultivated grasses	240	210
Wild, salt, or prairie grasses	55	100
Grains cut green	20,995	25,105
All other hay and forage	4,927	4,147
Totals	57,064	101,763

Poultry products—	
Poultry raised, number	84,062
Eggs produced, dozen	264,826
Value of poultry and eggs produced	$135,526
Honey and wax—	
Honey produced, pounds	514,125
Wax produced, pounds	4,453
Value of honey and wax produced	$27,121
Wool—	
Wool, fleeces shorn	12,755
Mohair and goat hair, fleeces shorn	26
Value of wool and mohair produced	$17,067
Special crops—	
Potatoes, acres	60
Sweet potatoes, acres	9
All other vegetables, acres	3,672
Orchard fruits—	Number bearing trees
Apples	86
Apricots	1,922
Peaches and nectarines	432
Prunes and plums	347
Total	3,170
Tropical fruits—	Number bearing trees
Figs	606
Lemons	36
Oranges	1,410
Olives	41
Total	2,411
Grapevines—	
Number in bearing	298,813
Small fruits—	
Blackberries and dewberries, acres	1
Nuts—	Number bearing trees
Almonds	29
Walnuts	24
Total	53

Irrigation.

Number of farms irrigated in 1909	1,250
Acres irrigated in 1909	190,711
Acreage enterprises were capable of irrigating in 1910	242,000
Acreage included in projects	375,000
Main ditches, number	12
Length, miles	117
Laterals, number	179
Length, miles	890
Cost of irrigation enterprises up to July 1, 1910	$4,955,272
Average cost per acre irrigation enterprises were capable of irrigating in 1910	20.48

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	2,958	$17,916
Copper, pounds	65	11
Gold	------	14,369
Silver	------	42
Stone, miscellaneous	------	40,095
Other minerals	------	5,000
Total		$77,433

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*Includes animals, age or sex not specified.

†Organized from San Diego County August 15, 1907.

INYO COUNTY.

Date of creation, March 22, 1866. *

		1890	1900	1910
Land area, 10,019 square miles.	Population	3,544	4,377	6,974
County seat, Independence (township).	Population	662	820	701

Population per square mile, 0.7.

	Highest	Lowest		Inches		Inches
Elevation, 3,907 feet. 1916: Temperature	103	—2	Rainfall	12.84	Snow	78.2

Inyo County lies on the eastern side of the Sierra Nevada Range and adjoins Esmeralda and Nye counties, Nevada. On the extreme western edge of the county are the high peaks of the Sierra, rising to altitudes of 14,000 feet and upward and covered throughout the year with snow. From these come numerous streams, which, descending rapidly, unite to form Owens River, flowing southerly along the base of the range to Owens Lake. To the east of this is a succession of ranges and deep valleys of what is known as the Great Basin type, similar to those in southern Nevada. The most noted among these lowlands between the mountains is Death Valley, the bottom of which is reported to be upward of 350 feet below sea level. Borax and similar substances are obtained in these depressions, but beyond these products the desert area has little present value.

Inyo, the second largest county, has the most diversified topography in the state, claiming as it does Mount Whitney, the highest elevation, and Death Valley, the lowest depression. The Sierra, which forms its western border, here attain their greatest altitude, there being many towering peaks scarcely inferior to Whitney itself.

All the agricultural land is contained in Owens Valley. This valley is about 100 miles long; at its northern end it is about 15 miles wide, narrowing to 2 miles half way down its length, where a spur of the Sierra almost divides it, and south of that broadening to an average of 6 to 8 miles.

The soil of Owens Valley is especially fertile. Grains and garden produce of all kinds are grown to perfection.

INYO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	28
10 to 19 acres	28
20 to 49 acres	55
50 to 99 acres	75
100 to 174 acres	113
175 to 259 acres	41
260 to 499 acres	54
500 to 999 acres	22
1,000 acres and over	20
Total	438
Total in 1900	424

Land and Farm Areas.

Approximate land, acres	6,412,160
Land in farms in 1910	116,142
Land in farms in 1900	141,050
Improved land in farms in 1910	38,698
Improved land in farms in 1900	43,740
Woodland in farms	1,631
Other unimproved land	69,813

Value of all Farm Property.

Total value in 1910	$7,112,903
Total value in 1900	2,571,629
Per cent increase 1900-1910	176.6
Land in 1910	5,210,586
Land in 1900	1,584,750
Buildings in 1910	558,740
Buildings in 1900	317,060
Implements and machinery in 1910	189,810
Implements and machinery in 1900	95,590
Domestic animals, poultry and bees in 1910	1,153,767
Domestic animals, poultry and bees in 1900	574,229

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,267
Other cows	8,970
Yearling heifers	2,583
Calves	2,255
Yearling steers and bulls	2,445
Other steers and bulls	1,788
Total	20,308
Value	$428,853

INYO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	7,074
Yearling colts	555
Spring colts	403
Total	5,032
Value	$453,277
Mules—	
Mature mules	249
Yearling colts	55
Spring colts	33
Total	337
Value	$31,960
Asses and burros—	
Number	309
Value	$5,845
Swine—	
Mature hogs	1,795
Spring pigs	1,560
Total	3,355
Value	$21,631
Sheep—	
Rams, ewes, and wethers	17,240
Spring lambs	26,106
Total	43,346
Value	$156,319
Goats—	
Number	2,846
Value	$6,596
Total value all domestic animals	$1,104,481
Poultry and bees—	
Poultry of all kinds	30,132
Value	$20,590
Colonies of bees	5,868
Value	$28,696

Principal Crops.

	Acres	Bushels
Corn	1,883	57,917
Oats	573	28,875
Wheat	1,715	50,858
Barley	678	19,381
Dry edible beans	70	1,055
Potatoes	326	52,894

Hay and forage—	Acres	Tons
Timothy alone	22	43
Timothy and clover mixed	1,906	3,589
Clover alone	12	15
Alfalfa	12,440	37,059
Other tame and cultivated grasses	697	893
Wild, salt, or prairie grasses	1,076	1,681
Grains cut green	28	49
All other hay and forage	28	276
Totals	16,209	43,605

Poultry products—	
Poultry raised, number	50,007
Eggs produced, dozen	146,952
Value poultry and eggs produced	$67,836
Honey and wax—	
Honey produced, pounds	312,620
Wax produced, pounds	2,131
Value honey and wax produced	$29,944
Wool—	
Wool, fleeces shorn	17,847
Mohair and goat hair, fleeces shorn	505
Value wool and mohair produced	$27,761
Special crops—	
Potatoes, acres	326
All other vegetables, acres	240

Orchard fruits—	Number bearing trees
Apples	19,611
Apricots	342
Cherries	539
Peaches and nectarines	4,602
Pears	2,668
Prunes and plums	2,349
Total	30,164

Tropical fruits—	Number bearing trees
Figs	14
Grapevines—	
Number in bearing	39,478

Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	8
All others, acres	8
Total	21

Nuts—	Number bearing trees
Almonds	28
Pecans	9
Walnuts	35
Total	72

Irrigation.

Number of farms irrigated in 1909	408
Acres irrigated in 1909	65,163
Acreage enterprises were capable of irrigating in 1910	71,815
Acreage included in projects	92,319
Main ditches, number	184
Length, miles	396
Laterals, number	326
Length, miles	168
Flowing wells, number	10
Pumped wells, number	1
Cost of irrigation enterprises up to July 1, 1910	$962,698
Average cost per acre irrigation enterprises were capable of irrigat- in 1910	$13.41

Mineral Production in 1915.

Substance	Amount	Value
Copper, pounds	154,722	$27,076
Gold	--------	317,905
Lead, pounds	4,323,639	203,211
Silver	--------	127,894
Soapstone and talc, tons	1,513	14,000
Soda, tons	5,799	83,485
Zinc, pounds	4,625,162	573,520
Other minerals*		1,423,951
Total		$2,771,042
Number of mineral springs		36

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*Includes antimony, borax, marble, pumice, salt, dolomite.

KERN COUNTY.

Date of creation, April 2, 1866.

		1890	1900	1910	1916 (estimated)
Land area, 8,003 square miles.	Population	9,808	16,480	37,715	------
County seat, *Bakersfield (city).	Population	2,626	4,836	12,727	16,874
Population per square mile, 4.7.					

		Highest	Lowest		Inches		Inches
Elevation, 404 feet. 1916:	Temperature	110	24	Rainfall	7.96	Snow	0

Kern County, situated at the extreme southern end of the San Joaquin Valley, its easterly boundary extending on to the Mojave Desert over the extreme southerly end of the Sierra Nevada Mountains, is the third largest county in the state.

At Randsburg, on the eastern border, is one of the largest gold mines on this coast, and the county around Randsburg has many smaller mines.

Along the southern border where the line crosses the San Emidio Mountains are large deposits of iron ore and antimony, which are yet undeveloped. Along the western side of the county are the Sunset, Midway, McKittrick and Lost Hills oil fields, lying along the eastern base of the Coast Range Mountains.

In the northern part of the county, and surrounding the town of Delano, is a large body of good land. Rice has been successfully grown in the county for several years.

In the northeastern part is the mining town of Kernville, surrounded by mines, and near it on the south fork of the Kern River is the South Fork Valley, where numerous stockmen have their alfalfa fields that furnish feed to the stock that pasture in the high Sierra in the summer time.

In the center, and surrounding the town of Bakersfield, the county seat, lie thousands of acres of fertile land that are irrigated by Kern River, and which are mostly used to raise stock and alfalfa, but large quantities of fruit, including oranges, are also raised in the county. The acreage in apricots, peaches, prunes, pears, olives, and oranges has increased very considerably in the last five years.

In the oil fields the development work is continuous. Lost Hills is being developed, and the discoveries there indicate that the petroleum-bearing territory is continuous from Sunset to the north line of the county.

Kern County is a long way ahead of all others in the value of minerals produced, amounting in 1915 to $25,335,184. The greater part of this sum is derived from the extensive oil fields.

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*Kern City annexed to Bakersfield in 1909.

KERN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	11
3 to 9 acres	46
10 to 19 acres	57
20 to 49 acres	320
50 to 99 acres	173
100 to 174 acres	222
175 to 259 acres	55
260 to 499 acres	116
500 to 999 acres	82
1,000 acres and over	85
Total	1,167
Total in 1900	1,098

Land and Farm Areas.

Approximate land, acres	5,121,920
Land in farms in 1910	1,403,350
Land in farms in 1900	1,571,106
Improved land in farms in 1910	315,387
Improved land in farms in 1900	324,031
Woodland in farms	235,014
Other unimproved land	852,949

Value of all Farm Property.

Total value in 1910	$30,405,013
Total value in 1900	14,246,125
Per cent increase 1900-1910	113.4
Land in 1910	23,962,202
Land in 1900	10,404,540
Buildings in 1910	1,252,139
Buildings in 1900	664,120
Implements and machinery in 1910	614,028
Implements and machinery in 1900	347,640
Domestic animals, poultry, and bees in 1910	4,576,644
Domestic animals, poultry, and bees in 1900	2,829,825

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	6,917
Other cows	38,101
Yearling heifers	8,441
Calves	7,372
Yearling steers and bulls	6,459
Other steers and bulls	24,271
Total	118,320
Value	*$3,051,957
Horses—	
Mature horses	8,670
Yearling colts	987
Spring colts	530
Total	10,347
Value	$1,013,562
Mules—	
Mature mules	1,099
Yearling colts	103
Spring colts	46
Total	1,248
Value	$146,095
Asses and burros—	
Number	130
Value	$12,543
Swine—	
Mature hogs	13,376
Spring pigs	7,137
Total	20,513
Value	$167,439
Sheep—	
Rams, ewes, and wethers	19,801
Spring lambs	10,516
Total	30,317
Value	$114,137
Goats—	
Number	930
Value	$3,305
Total value all domestic animals	$4,509,038
Poultry and bees—	
Poultry of all kinds	75,900
Value	$51,438
Colonies of bees	4,501
Value	$16,168

Principal Crops.

	Acres	Bushels
Corn	466	7,132
Oats	82	770
Wheat	12,924	139,375
Barley	22,492	517,029
Kafir corn and milo maize	2,813	45,828
Dry edible beans	26	648
Potatoes	339	51,666
Hay and forage—	Acres	Tons
Alfalfa	23,600	73,259
Other tame and cultivated grasses	12	12
Wild, salt, or prairie grasses	148	105
Grains cut green	30,069	35,441
All other hay and forage	5,126	4,178
Totals	58,955	112,995

Poultry products—	
Poultry raised, number	89,520
Eggs produced, dozen	394,130
Value poultry and eggs produced	$148,062
Honey and wax—	
Honey produced, pounds	204,920
Wax produced, pounds	2,832
Value of honey and wax produced	$12,159
Wool—	
Wool, fleeces shorn	24,177
Mohair and goat hair, fleeces shorn	355
Value wool and mohair produced	$26,540
Special crops—	
Potatoes, acres	339
Sweet potatoes, acres	31
All other vegetables, acres	589
Orchard fruits—	Number bearing trees
Apples	7,725
Apricots	33,573
Cherries	163
Peaches and nectarines	35,149
Pears	1,057
Prunes and plums	58,075
Total	136,088

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*Includes animals, age and sex not specified.

KERN COUNTY SUMMARY—Continued.

Tropical fruits—	Number bearing trees
Figs	1,475
Lemons	54
Oranges	80,940
Pomeloes	16
Olives	393
Total	82,888

Grapevines—	
Number in bearing	419,582
Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	26
All others, acres	6
Total, acres	34

Nuts—	Number bearing trees
Almonds	3,101
Pecans	563
Walnuts	127
Total	3,819

Irrigation.

Number of farms irrigated in 1909	876
Acres irrigated in 1909	190,034
Acreage enterprises were capable of irrigating in 1910	217,418
Acreage included in projects	402,806
Main ditches, number	178
Length, miles	441
Laterals, number	118
Length, miles	257
Flowing wells, number	25
Pumped wells, number	140
Cost of irrigation enterprises up to July 1, 1910	$1,788,635
Average cost per acre irrigation enterprises were capable of irrigating in 1910	8.23

Mineral Production in 1915.

Substance	Amount	Value
Antimony, tons	267	$11,301
Copper, pounds	1,047	183
Gold	--------	983,319
Lead, pounds	84,371	3,965
Lime, barrels	55,176	39,523
Limestone, tons	1,425	1,710
Natural gas, M cu. ft.	12,163,461	737,638
Petroleum, barrels	54,810,669	23,184,913
Silver	--------	13,316
Stone	--------	59,319
Other minerals†	--------	299,997
Total	--------	$25,335,184

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†Includes cement, clay (pottery), fuller's earth, gypsum, magnesite, salt, tungsten.

KINGS COUNTY.

Date of creation, March 22, 1893; organized from part of Tulare County; extended in 1909 by annexation of part of Fresno County.*

		1890	1900	1910	1915 (estimated)
Land area, 1,159 square miles.	Population	-----	9,871	16,230	------
County seat, Hanford (city).	Population	942	2,929	4,829	6,250
Population per square mile, 14.0.					

		Highest	Lowest		Inches		Inches
Elevation, 249 feet.	1916: Temperature	108	20	Rainfall	11.55	Snow	0

In the very heart of the great fertile valley of the San Joaquin lies Kings County, one of the smallest, one of the youngest, but one of the richest counties of this state.

There are no rocks to contend with, no land to clean, no hills and hollows to level.

Wheat and other kinds of grain were in former years the most important products of Kings County soil. Immense tracts of land were originally sown and great crops gathered in, but with the subdividing of the land into smaller holdings, the growing of grain is not so extensive an industry at the present time.

Viticulture is an industry that has assumed large proportions. There are nearly 5,000,000 grapevines in the county.

Barley and alfalfa form two of the leading products.

Sugar beets are a great factor in Kings County prosperity. The discovery a few years ago that a great deal of what seemed to be almost waste land is particularly well adapted to the raising of this product, has changed the whole face of the county in some parts. About Corcoran, where the erection of a large sugar factory has opened up a market, the growing of beets is being prosecuted very extensively.

Dairying ranks secondary to fruit and grape culture. There are many creameries and skimming stations located so as to be in convenient touch with all sections of the county, and there is a constant and ever-increasing demand for butter fat.

The Kings River supplies most of the water required for irrigation, but Cross Creek or Kaweah River, at the easterly end of the county, a stream of lesser proportions, does its full share in this work of irrigation. It was in 1872 that the plan of irrigating from these streams was first put into practical operation. The principal irrigating companies at present operating in the county are the People's Ditch Company, the Last Chance Ditch Company, the Lemoore Canal and Irrigation Company, the Lakeside Ditch Company; and other smaller ones are also in operation.

(*Information supplied by the Chamber of Commerce.*)

Estimated population in 1915, Hanford, 6,250; Kings County, 21,450.

The live stock amounted to $1,320,000; the butter and cream, $1,700,000; the grain, $1,686,250; the fruit, $2,015,000; the alfalfa forage crop, $1,750,000. This total of $8,471,250 does not include poultry, nuts, melons, honey, small fruits and a great variety of other products sold and consumed in the county.

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*202 miles of Fresno and 96 miles of Tulare counties were annexed in 1909.

KINGS COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	69
10 to 19 acres	159
20 to 49 acres	643
50 to 99 acres	377
100 to 174 acres	287
175 to 259 acres	77
260 to 499 acres	133
500 to 999 acres	42
1,000 acres and over	43
Total	1,837
Total in 1900	932

Land and Farm Areas.

Approximate land, acres	741,760
Land in farms in 1910	373,823
Land in farms in 1909	387,505
Improved land in farms in 1910	196,569
Improved land in farms in 1900	262,148
Woodland in farms	6,724
Other unimproved land	170,530

Value of all Farm Property.

Total value in 1910	$33,312,292
Total value in 1900	5,921,907
Land in 1910	26,007,591
Land in 1900	3,420,410
Buildings in 1910	2,145,975
Buildings in 1900	811,920
Implements and machinery in 1910	654,971
Implements and machinery in 1900	348,330
Domestic animals, poultry and bees in 1910	4,503,755
Domestic animals, poultry and bees in 1900	1,341,247

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	18,593
Other cows	21,655
Yearling heifers	7,281
Calves	8,793
Yearling steers and bulls	3,745
Other steers and bulls	14,908
Total	74,975
Value	$2,481,281
Horses—	
Mature horses	9,417
Yearling colts	1,174
Spring colts	882
Total	11,473
Value	$1,256,415
Mules—	
Mature mules	855
Yearling colts	142
Spring colts	72
Total	1,069
Value	$148,430
Asses and burros—	
Number	23
Value	$10,077
Swine—	
Mature hogs	22,775
Spring pigs	17,858
Total	40,633
Value	$295,301
Sheep—	
Rams, ewes and wethers	40,483
Spring lambs	21,891
Total	62,374
Value	$233,005
Goats—	
Number	507
Value	$1,902
Total value all domestic animals	$4,426,411
Poultry and bees—	
Poultry of all kinds	102,747
Value	$59,708
Colonies of bees	4,670
Value	$17,630

Principal Crops.

	Acres	Bushels
Corn	2,274	43,688
Oats	109	4,490
Wheat	8,684	141,978
Barley	19,287	402,432
Kafir corn and milo maize	3,931	95,010
Dry edible beans	21	576
Potatoes	194	17,658

Hay and forage—	Acres	Tons
Clover alone	13	51
Alfalfa	36,778	123,112
Other tame and cultivated grasses	2,023	2,025
Wild, salt, or prairie grasses	833	734
Grains cut green	17,629	28,629
All other hay and forage	473	3,755
Totals	57,749	158,306

Poultry products—	
Poultry raised, number	153,839
Eggs produced, dozen	687,052
Value poultry and eggs produced	$248,495
Honey and wax—	
Honey produced, pounds	238,791
Wax produced, pounds	3,148
Value of honey and wax produced	$12,028
Wool—	
Wool, fleeces shorn	73,393
Mohair and goat hair, fleeces shorn	261
Value of wool and mohair produced	$58,836
Special crops—	
Potatoes, acres	194
Sweet potatoes, acres	19
All other vegetables, acres	674
Sugar beets, acres	504

Orchard fruits—	Number bearing trees
Apples	4,106
Apricots	124,007
Cherries	11
Peaches and nectarines	777,697
Pears	4,379
Prunes and plums	132,192
Total	1,048,506

Tropical fruits—	Number bearing trees
Figs	391
Oranges	24
Olives	5
Total	425

KINGS COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Grapevines—	
Number in bearing	4,538,732
Small fruits—	
Strawberries, acres	15
Blackberries and dewberries, acres	13
All others, acres	3
Total	31

Nuts—	Number bearing trees
Almonds	1,721
Pecans	2
Walnuts	24
Total	1,747

Irrigation.

Number of farms irrigated in 1909	1,126
Acres irrigated in 1909	190,949
Acreage enterprises were capable of irrigating in 1910	289,523
Acreage included in projects	310,523
Main ditches, number	27
Length, miles	137
Laterals, number	51
Length, miles	159
Flowing wells, number	75
Pumped wells, number	20
Cost of irrigation enterprises up to July 1, 1910	$687,381
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$2.37

Mineral Production in 1915.

Substance	Amount	Value
Natural gas, M cubic feet	258	$608
Other minerals†	-----	18,000
Total		$18,608

†Includes fuller's earth and quicksilver.

LAKE COUNTY.

Date of creation, May 20, 1861.

		1890	1900	1910	1915 (estimated)
Land area, 1,278 square miles.	Population	7,101	6,017	5,526	------
County seat, Lakeport (town).	Population	991	726	870	1,100
Population per square mile, 4.3.					

Sulphur Banks (Station):		Highest	Lowest		Inches		Inches
Elevation, 1,350 feet.	1916: Temperature	105	12	Rainfall	23.72	Snow	25.3

The county is located in the heart of the Coast Range, about 100 miles north of San Francisco, and is about 75 miles long and 25 miles wide. Mount St. Helena guards the southern extremity. Clear Lake is a splendid sheet of fresh water 25 miles long and from 2 to 10 miles broad, with the lake surface at an elevation of 1,350 feet above sea level. It is stocked with a large quantity of fish. Clear Lake is the pride of Lake County, as well as the source of its name.

Although classed as mountainous, Lake County has a number of very fertile valleys, some of them being of large area. The acreage in farm crops is small compared with most other counties, but a considerable quantity of peas and beans are raised for canning purposes. Artesian water is obtainable in profuse quantities.

The rocky hillsides furnish pasturage for flocks of Angora goats. Large bodies of sugar and yellow pine, fir, cedar, and oak give employment to several sawmills and furnish the home market a good quality of lumber.

The minerals have heretofore been represented by the quicksilver industry. Besides quicksilver, immense quantities of mineral water have been bottled at the many mineral springs and shipped to all parts of the country. Lake County has fifty-six mineral springs, or more than any other county in the state.

LAKE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	10
10 to 19 acres	38
20 to 49 acres	85
50 to 99 acres	80
100 to 174 acres	144
175 to 259 acres	60
260 to 499 acres	84
500 to 999 acres	53
1,000 acres and over	48
Total	603
Total in 1900	723

Land and Farm Areas.

Approximate land, acres	817,920
Land in farms in 1910	217,464
Land in farms in 1900	212,176
Improved land in farms in 1910	42,768
Improved land in farms in 1900	41,414
Woodland in farms	71,388
Other unimproved land	103,308

Value of all Farm Property.

Total value in 1910	$6,271,615
Total value in 1900	3,495,090
Per cent increase 1900-1910	79.4
Land in 1910	$4,792,480
Land in 1900	2,419,280
Buildings in 1910	782,735
Buildings in 1900	524,180
Implements and machinery in 1910	207,211
Implements and machinery in 1900	111,420
Domestic animals, poultry and bees in 1910	489,189
Domestic animals, poultry and bees in 1900	440,210

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	1,487
Other cows	2,113
Yearling heifers	821
Calves	1,133
Yearling steers and bulls	574
Other steers and bulls	1,286
Total	7,414
Value	$148,781
Horses—	
Mature horses	2,172
Yearling colts	216
Spring colts	104
Total	2,492
Value	$210,382

LAKE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	182
Yearling colts	45
Spring colts	36
Total	263
Value	$22,015
Asses and burros—	
Number	10
Value	$2,730
Swine—	
Mature hogs	5,301
Spring pigs	2,737
Total	8,038
Value	$39,239
Sheep—	
Rams, ewes and wethers	7,436
Spring lambs	3,511
Total	10,947
Value	$27,167
Goats—	
Number	9,018
Value	$21,114
Total value all domestic animals	$471,428
Poultry and bees—	
Poultry of all kinds	27,435
Value	$17,086
Colonies of bees	276
Value	$675

Principal Crops.

	Acres	Bushels
Corn	981	26,317
Oats	843	19,914
Wheat	2,563	46,131
Barley	2,825	54,758
Potatoes	182	21,773

Hay and forage—	Acres	Tons
Timothy alone	50	60
Timothy and clover mixed	104	180
Clover alone	330	452
Alfalfa	2,795	7,260
Other tame and cultivated grasses	385	391
Wild, salt, or prairie grasses	1,152	1,316
Grains cut green	7,810	9,351
All other hay and forage	27	79
Totals	12,653	19,089

Poultry products—	
Poultry raised, number	37,976
Eggs produced, dozen	135,001
Value poultry and eggs produced	$56,581
Honey and wax—	
Honey produced, pounds	5,105
Wax produced, pounds	43
Value of honey and wax produced	$455

Wool—	
Wool, fleeces shorn	10,372
Mohair and goat hair, fleeces shorn	6,603
Value wool and mohair produced	$12,922
Special crops—	
Potatoes, acres	182
All other vegetables, acres	353

Orchard fruits—	Number bearing trees
Apples	22,254
Apricots	1,463
Cherries	590
Peaches and nectarines	9,288
Pears	39,075
Prunes and plums	47,244
Total	120,037

Tropical fruits—	Number bearing trees
Figs	1,062
Lemons	8
Oranges	72
Olives	3,198
Total	4,340

Grapevines—	
Number in bearing	296,752
Small fruits—	
Strawberries, acres	6
Blackberries and dewberries, acres	15
All others, acres	4
Total	25

Nuts—	Number bearing trees
Almonds	8,281
Pecans	6
Walnuts	564
Total	8,920

Irrigation.

Number of farms irrigated in 1909	43
Acres irrigated in 1909	582
Acreage enterprises were capable of irrigating in 1910	828
Acreage included in projects	1,268
Main ditches, number	44
Length, miles	26
Laterals, number	21
Length, miles	2
Flowing wells, number	1
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$12,124
Average cost per acre irrigation enterprises were capable of irrigating in 1910	14.64

Mineral Production in 1915.

Substance	Amount	Value
Mineral water, gallons	165,130	$24,371
Quicksilver, flasks	492	41,660
Stone, miscellaneous		5,000
Other minerals*		1,503
Total		$72,534
Number of mineral springs		56

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*Includes copper, gold and silver.

LASSEN COUNTY.

Date of creation, April 1, 1864.

Land area, 4,531 square miles.
County seat, Susanville (town).
Population per square mile, 1.1.

	1890	1900	1910	1915 (estimated)
Population	4,239	4,511	4,802	------
Population	-----	-----	688	1,000

Madeline (Station):

		Highest	Lowest		Inches		Inches
Elevation, 5,276 feet.	1916: Temperature	91	—23	Rainfall	18.60	Snow	150.0

Lassen County lies in the northeastern part of California along the Nevada line. It is traversed from south to north by the Nevada-California-Oregon Railway (narrow gauge), which connects at Reno, Nevada, with the Southern Pacific system. Susanville, the county seat, is in Honey Lake Valley, a little south of the center of the county. Lassen embraces large areas, comprising rich valley lands, suited to agriculture; rolling hills and uplands, affording splendid range for stock, and mountain tablelands covered with timber.

The principal present industries are farming and stock raising.

The altitude of the largest, most fertile, and most productive valleys, such as Honey Lake Valley, Big Valley, and Long Valley, is a little over 4,000 feet. Other large valleys, like Madeline Plains, Willow Creek Valley, and Secret Valley, are in the neighborhood of 5,000 feet above sea level. While the high valleys are not as well adapted to general farming as the lower ones, they are quite productive, and well suited to the stock-raising business. The climate generally is similar to that of the northeastern states, so far as range of temperature is concerned, but the summer season is quite dry, making irrigation necessary as a rule. Of farm products, alfalfa is probably the most important, though native grasses, timothy, and redtop are extensively raised.

Good hay and grass and pure cold water make the county an ideal one for dairying. There are a number of creameries in the county.

LASSEN COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	9
10 to 19 acres	4
20 to 49 acres	12
50 to 99 acres	32
100 to 174 acres	117
175 to 259 acres	51
260 to 499 acres	130
500 to 999 acres	84
1,000 acres and over	63
Total	502
Total in 1900	555

Land and Farm Areas.

Approximate land, acres	2,899,840
Land in farms in 1910	295,728
Land in farms in 1900	381,109
Improved land in farms in 1910	122,057
Improved land in farms in 1900	133,266
Woodland in farms	27,688
Other unimproved land	145,983

Value of all Farm Property.

Total value in 1910	$9,376,809
Total value in 1900	5,365,615
Per cent increase 1900-1910	74.8
Land in 1910	6,331,832
Land in 1900	2,949,510
Buildings in 1910	765,460
Buildings in 1900	708,010
Implements and machinery in 1910	289,287
Implements and machinery in 1900	255,220
Domestic animals, poultry and bees in 1910	1,990,230
Domestic animals, poultry and bees in 1900	1,452,875

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,890
Other cows	18,444
Yearling heifers	5,975
Calves	4,906
Yearling steers and bulls	5,456
Other steers and bulls	6,161
Total	43,832
Value	$871,941

LASSEN COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	7,548
Yearling colts	1,406
Spring colts	561
Total	9,515
Value	$702,420
Mules—	
Mature mules	414
Yearling colts	185
Spring colts	103
Total	702
Value	$60,681
Asses and burros—	
Number	119
Value	$20,220
Swine—	
Mature hogs	3,079
Spring pigs	1,955
Total	5,034
Value	$30,513
Sheep—	
Rams, ewes and wethers	42,490
Spring lambs	30,235
Total	72,725
Value	$291,592
Goats—	
Number	586
Value	1,832
Total value all domestic animals	$1,979,199
Poultry and bees—	
Poultry of all kinds	19,297
Value	$9,957
Colonies of bees	298
Value	$1,074

Principal Crops.

	Acres	Bushels
Corn	4	93
Oats	977	25,647
Wheat	9,938	153,863
Barley	3,244	63,471
Potatoes	259	35,703

Hay and forage—	Acres	Tons
Timothy alone	295	649
Timothy and clover mixed	9,475	13,239
Alfalfa	11,709	27,452
Other tame and cultivated grasses	1,723	2,836
Wild, salt, or prairie grasses	36,879	45,016
Grains cut green	2,677	3,442
Total	62,758	92,634

Poultry products—	
Poultry raised, number	28,907
Eggs produced, dozen	106,897
Value of poultry and eggs produced	$161,289
Honey and wax—	
Honey produced, pounds	5,642
Wax produced, pounds	5
Value of honey and wax produced	$643
Wool—	
Wool, fleeces shorn	36,768
Mohair and goat hair, fleeces shorn	2,088
Value wool and mohair produced	$55,154
Special crops—	
Potatoes, acres	259
Sugar beets, acres	2
All other vegetables, acres	184

Orchard fruits—	Number bearing trees
Apples	12,679
Apricots	70
Cherries	439
Peaches and nectarines	1,455
Pears	632
Prunes and plums	2,223
Total	17,511

Grapevines—	
Number in bearing	31
Small fruits—	
Strawberries, acres	3
Blackberries and dewberries, acres	2
All others, acres	15
Total	20

Nuts—	Number bearing trees
Almonds	8
Walnuts	8
Total	16

Irrigation.

Number of farms irrigated in 1909	355
Acres irrigated in 1909	77,079
Acreage enterprises were capable of irrigating in 1910	89,815
Acreage included in projects	149,530
Main ditches, number	295
Length, miles	368
Laterals, number	263
Length, miles	116
Cost of irrigation enterprises up to July 1, 1910	$884,965
Average cost per acre irrigation enterprises were capable of irrigating in 1910	9.85

Mineral Production in 1915.

Stone, miscellaneous	$870
Number of mineral springs	19

LOS ANGELES COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1916 (estimated)
Land area, 4,067 square miles.	Population--	101,454	170,298	504,131	------
County seat, Los Angeles.	Population--	50,395	102,479	319,198	503,812
Population per square mile, 124.0.					

	Highest	Lowest		Inches		Inches
Elevation, 293 feet. 1916: Temperature-----	96	36	Rainfall---	23.29	Snow---	0

In wealth, population, and resources Los Angeles is the most important county in southern California. There are two rivers in the county, the Los Angeles and the San Gabriel. During a large part of the year these are dry beds of sand, what little water they contain finding its way through the porous sand to the bedrock. In the winter they are dangerous streams. The Los Angeles River rises in the western part of the San Fernando Valley, about 12 miles northwest of the city, and flows easterly 18 miles to the Los Angeles Pass. Its stream is fed all along by springs. Turning south, it flows through the Los Angeles Pass, and on through the city.

Los Angeles County embraces within its limits a great variety of scenery and climate. Within its territory may be found the climate and scenery of almost every part of the state, from the cool and breezy seashore to the warm inland plains and bracing mountain tops. Of the area of the county, about four-fifths is capable of cultivation, the remainder being mountainous. The shore line is 85 miles in length. Nine-tenths of the population is within thirty miles of the ocean.

The chief industry is horticulture, the list of products including everything that can be grown in the state. The area of land devoted to horticultural purposes is being rapidly extended as the large tracts are subdivided and improved.

Perhaps the most important enterprise for Los Angeles is the big breakwater by the federal government at San Pedro. Other shipping points of the county are Port Los Angeles, near Santa Monica, and Redondo.

The San Gabriel Valley, a choice section of Los Angeles County, has the Sierra Madre Range on the north. The mountains are grand and precipitous, enclosing the valley like a wall. This valley is the best known of any portion of southern California.

The valley contains 100 square miles of territory. The San Gabriel contains some of the choicest fruit lands in southern California, and is largely devoted to the raising of oranges and lemons, as well as deciduous fruits.

Pasadena, a beautiful city, is located at the foot of the Sierra Madre Range, about seven miles from Los Angeles. Within twenty years Pasadena has grown from a sheep pasture to a city of beautiful homes.

Adjoining San Gabriel Valley on the east is Pomona Valley. Irrigation is cheaply supplied to this section from the San Antonio River. The soil and climate are particularly adapted to the culture of citrus fruits. It contains a number of flourishing towns, the chief of which is Pomona, one of the most thriving cities in southern California.

The development of the horticultural industry during the past few years has been remarkable. The most important horticultural product is the orange. Besides the orange and lemon, the principal fruits raised are the almond, fig, prune, apricot, walnut, peach, pear, and berries. Deciduous fruits are shipped fresh, canned, dried, and crystalized.

Ostriches are raised for their plumes, and the industry is profitable. There is a large ostrich farm at South Pasadena.

San Pedro is the headquarters of the tunny fish industry, which was only established three or four years ago, but the pack has steadily increased. In 1911, 42,000 cases were packed; in 1913, 115,000, and in 1914, 325,000 cases.

LOS ANGELES COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	438
3 to 9 acres	2,125
10 to 19 acres	1,820
20 to 49 acres	1,709
50 to 99 acres	698
100 to 174 acres	531
175 to 259 acres	192
260 to 499 acres	207
500 to 999 acres	114
1,000 acres and over	85
Total	7,919
Total in 1900	6,577

Land and Farm Areas.

Approximate land, acres	2,602,880
Land in farms in 1910	757,985
Land in farms in 1900	895,663
Improved land in farms in 1910	418,998
Improved land in farms in 1900	518,744
Woodland in farms	18,051
Other unimproved land	320,936

Value of all Farm Property.

Total value in 1910	$199,998,200
Total value in 1900	74,817,646
Per cent increase 1900-1910	167.3
Land in 1910	180,354,798
Land in 1900	64,189,220
Buildings in 1910	11,798,273
Buildings in 1900	6,702,710
Implements and machinery in 1910	2,462,387
Implements and machinery in 1900	1,433,050
Domestic animals, poultry, and bees in 1910	*5,382,742
Domestic animals, poultry and bees in 1900	2,492,666

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	20,524
Other cows	8,027
Yearling heifers	5,561
Calves	6,211
Yearling steers and bulls	1,666
Other steers and bulls	1,106
Total	43,095
Value	$1,473,509
Horses—	
Mature horses	20,375
Yearling colts	1,376
Spring colts	673
Total	22,424
Value	$2,479,207
Mules—	
Mature mules	2,459
Yearling colts	76
Spring colts	35
Total	2,570
Value	$390,200
Asses and burros—	
Number	84
Value	$3,806
Swine—	
Mature hogs	18,418
Springs pigs	10,524
Total	28,942
Value	$230,390
Sheep—	
Rams, ewes, and wethers	22,261
Spring lambs	8,830
Total	31,091
Value	$136,536
Goats—	
Number	8,238
Value	$20,839
Total value all domestic animals	$4,734,487
Poultry and bees—	
Poultry of all kinds	513,965
Value	$547,968
Colonies of bees	25,930
Value	$99,762

Principal Crops.

	Acres	Bushels
Corn	9,084	249,295
Oats	973	38,720
Wheat	6,760	59,866
Barley	32,804	785,129
Kafir corn and milo maize	106	2,145
Dry edible beans	3,874	105,011
Potatoes	4,140	413,151

Hay and forage—	Acres	Tons
Timothy alone	25	45
Clover alone	52	152
Alfalfa	19,027	100,855
Other tame and cultivated grasses	2,160	2,943
Wild, salt, or prairie grasses	651	793
Grain cut green	129,978	189,856
All other hay and forage	2,155	21,897
Totals	154,048	316,541

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*Including Belgian hares valued at $525.

LOS ANGELES COUNTY SUMMARY—Continued.

Poultry products—	
Poultry raised, number	586,566
Eggs produced, dozen	2,332,397
Value poultry and eggs produced	951,299

Honey and wax—	
Honey produced, pounds	1,289,820
Wax produced, pounds	15,501
Value of honey and wax produced	$93,569

Wool—	
Wool, fleeces shorn	31,754
Mohair and goat hair, fleeces shorn	230
Value wool and mohair produced	$32,366

Special crops—	
Potatoes, acres	4,140
Sweet potatoes, acres	342
All other vegetables, acres	13,385
Sugar beets, acres	14,191

Orchard fruits—	Number bearing trees
Apples	101,433
Apricots	122,769
Cherries	795
Peaches and nectarines	160,197
Pears	16,149
Prunes and plums	43,592
Total	446,698

Tropical fruits—	Number bearing trees
Figs	15,736
Lemons	219,149
Oranges	1,674,695
Pomeloes	6,853
Olives	84,934
Total	1,994,402

Grapevines—	
Number in bearing	4,923,877

Small fruits—	
Strawberries, acres	1,380
Blackberries and dewberries, acres	280
All others, acres	315
Total	1,975

Nuts—	Number bearing trees
Almonds	76,949
Pecans	313
Walnuts	281,837
Total	359,349

Irrigation.

Number of farms irrigated in 1909	4,669
Acres irrigated in 1909	145,586
Acreage enterprises were capable of irrigating in 1910	183,506
Acreage included in projects	241,794
Main ditches, number	601
Length, miles	800
Laterals, number	494
Length, miles	500
Flowing wells, number	376
Pumped wells, number	1,673
Cost of irrigation enterprises up to July 1, 1910	$7,817,023
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$42.60

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	88,669	$820,312
Clay (pottery), tons	6,507	1,511
Gems	-------	700
Mineral water, gallons	350,171	29,491
Natural gas, M cu. ft.	1,729,035	120,783
Petroleum, barrels	2,931,098	1,843,661
Stone, miscellaneous	-------	1,022,134
Other minerals†	------	330,020
Total	-------	$4,168,612
Number of mineral springs		14

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†Includes barite, borax, potash, salt.

MADERA COUNTY.

Date of creation, March 11, 1893.

		1890	1900	1910	1915 (estimated)
Land area, 2,112 square miles.	Population	-----	6,364	8,368	------
County seat, Madera (city).	Population	-----	-----	2,404	3,300
Population per square mile, 4.0.					

Storey (Station):		Highest	Lowest		Inches		Inches
Elevation, 296 feet.	1916: Temperature	105	26	Rainfall	18.02	Snow	0

Madera County is in the center of the San Joaquin Valley, bounded on the north by Merced and Mariposa counties, on the southeast and west by Fresno County, from which it was formed in 1893. The eastern portion of the county extends far up in the Sierra Nevada Mountains. From the foothills to the San Joaquin River, a distance of about forty miles, the land is level and adapted to all kinds of agricultural pursuits. The melting snows of the mountains flow through numerous small creeks into the San Joaquin River, or serve to supply the farming section with water for irrigation. The higher mountains are heavily timbered with valuable wood, principally sugar and white pine. Lumbering, stock raising, quarrying, mining, fruit growing, and farming are the principal industries. There are two large wineries in the county. The power plant of the San Joaquin Light and Power Company is near North Fork, in this county. The granite quarries at Knowles furnish employment to a large number of men.

San Francisco post office and many other public and business buildings in various cities of the state are built of the granite from these quarries.

(*Information supplied by the Chamber of Commerce.*)

The valley climate of Madera County boasts three hundred sunny days during the year, with sufficient rainfall for grain, hay, grapes and similar crops. The dairymen depend on irrigation to obtain the best results from alfalfa fields, and many fruit growers also use much water for their crops.

Irrigation water is now secured chiefly from wells, which at a shallow depth give good supply. About 10,000 acres is the extent supplied from sources other than wells, but there is strong agitation for the formation of an immense irrigation district, to bring gravity water from the San Joaquin and Fresno rivers to an area of 100,000 acres or more. To further this the Madera County Irrigation Bureau was organized and has done active work.

This county, until recently, was one of large individual land holdings. A single firm owned over 200,000 acres; another 108,000 acres; thousand-acre ranches were not considered large. Now the big holders are beginning to subdivide and the modest rancher who seeks to make a living on forty, sixty or eighty acres, is coming more and more into his own. Alfalfa fed to hogs and cows is one of the chief sources of gain. A large cooperative creamery in Madera monthly disburses thousands of dollars to dairymen. Fruits do well, raisins, figs and olives being among the chief money makers. On the mountain and foothill farms apples attain delicious flavor. Away from the valley there remains some government land open to entry. The total was increased recently by an order throwing open tracts before held in the National Forest. Much of this is excellent for cattle grazing and a portion can be cleared and profitably farmed.

The Mother Lode of the Sierra Nevadas extends into this county and along it are located many gold mines, some of which have earned records as producers. Farther back are vast deposits of iron ore and some copper. These are difficult of access and development has been greatly retarded on this account. Iron ore from the Minarets district runs 65 to 70 per cent. There are known deposits of lead, tin, zinc, tungsten, cobalt, asbestos and platinum and the problem of their development is one of transportation. Listed among the largest granite quarries in the state, those near Raymond have supplied stone for San Francisco's city hall, post office and other beautiful granite structures throughout the West.

In 1915 the lumber cut here was 35,000,000 feet—sugar pine and yellow pine, fir and incense cedar. The government owns many million feet of standing timber in this vicinity, offered for sale on terms imposed to insure adequate and scientific development.

The Mariposa Big Tree Grove skirts Madera County and the mountain highways offer great scenic beauties to the tourist bound for Yosemite Valley, just beyond its borders.

The state highway intersects Madera County, north and south.

MADERA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	----------
3 to 9 acres	13
10 to 19 acres	21
20 to 49 acres	76
50 to 99 acres	23
100 to 174 acres	151
175 to 259 acres	27
260 to 499 acres	66
500 to 999 acres	59
1,000 acres and over	137
Total	573
Total in 1900	523

Land and Farm Areas.

Approximate land, acres	1,351,680
Land in farms in 1910	620,663
Land in farms in 1900	484,659
Improved land in farms in 1910	391,086
Improved land in farms in 1900	277,721
Woodland in farms	41,612
Other unimproved land	187,965

Value of all Farm Property.

Total value in 1910	$14,984,395
Total value in 1900	5,916,894
Per cent increase 1900-1910	153.3
Land in 1910	12,263,638
Land in 1900	4,588,770
Buildings in 1910	771,595
Buildings in 1900	433,050
Implements and machinery in 1910	441,455
Implements and machinery in 1900	214,100
Domestic animals, poultry, and bees in 1910	1,507,707
Domestic animals, poultry, and bees in 1900	680,974

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	1,592
Other cows	12,406
Yearling heifers	2,425
Calves	2,975
Yearling steers and bulls	2,252
Other steers and bulls	3,946
Total	27,905
Value	*$582,792
Horses—	
Mature horses	3,498
Yearling colts	334
Spring colts	238
Total	4,070
Value	$386,856
Mules—	
Mature mules	2,928
Yearling colts	154
Spring colts	59
Total	3,141
Value	$454,606
Asses and burros—	
Number	49
Value	$9,301
Swine—	
Mature hogs	4,444
Spring pigs	2,409
Total	6,853
Value	$36,151

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*Includes animals, age and sex not specified.

MADERA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes, and wethers	6,269
Spring lambs	3,837
Total	10,106
Value	$23,145
Goats—	
Number	278
Value	$717
Total value all domestic animals	$1,493,568
Poultry and bees—	
Poultry of all kinds	23,246
Value	$13,024
Colonies of bees	375
Value	$1,115

Principal Crops.

	Acres	Bushels
Corn	1	50
Oats	10,569	175,047
Wheat	39,468	370,499
Barley	90,341	1,170,945
Kafir corn and milo maize	343	4,948
Dry edible beans	15	333
Potatoes	75	6,662

Hay and forage—	Acres	Tons
Timothy alone	5	6
Alfalfa	5,735	16,717
Other tame and cultivated grasses	60	73
Wild, salt, or prairie grasses	516	423
Grain cut green	11,283	12,757
All other hay and forage	7	2
Totals	17,606	29,978

Poultry products—	
Poultry raised, number	28,137
Eggs produced, dozen	67,932
Value poultry and eggs produced	$29,336
Honey and wax—	
Honey produced, pounds	16,439
Wax produced, pounds	370
Value of honey and wax produced	$1,052
Wool—	
Wool, fleeces shorn	4,905
Mohair and goat hair, fleeces shorn	60
Value wool and mohair produced	$2,272
Special crops—	
Potatoes, acres	75
Sweet potatoes, acres	2
All other vegetables, acres	256

Orchard fruits—	Number bearing trees
Apples	20,576
Apricots	9,408
Cherries	40
Peaches and nectarines	40,989
Pears	1,185
Prunes and plums	7,570
Total	80,156

Tropical fruits—	Number bearing trees
Figs	4,321
Lemons	15
Oranges	184
Pomeloes	2
Olives	18,010
Total	22,532

Grapevines—	
Number in bearing	1,530,630
Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	3
All others, acres	2
Total	7

Nuts—	Number bearing trees
Almonds	2,778
Pecans	5
Walnuts	14
Total	2,797

Irrigation.

Number of farms irrigated in 1909	158
Acres irrigated in 1909	38,705
Acreage enterprises were capable of irrigating in 1910	51,230
Acreage included in projects	82,321
Main ditches, number	34
Length, miles	79
Laterals, number	30
Length, miles	294
Pumped wells, number	33
Cost of irrigation enterprises up to July 1, 1910	$512,098
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$10.00

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	200	$1,400
Copper, pounds	40,294	7,051
Gold	-----	11,214
Silver	-----	2,126
Stone, miscellaneous	-----	122,272
Other minerals	-----	1,000
Total	-----	$145,063
Number mineral springs		10

MARIN COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 529 square miles.	Population	13,072	15,702	25,114	------
County seat, San Rafael (city).	Population	3,290	3,879	5,934	6,000
Population per square mile, 47.5.					

Point Reyes (Station):		Highest	Lowest		Inches		Inches
Elevation, 490 feet.	1916: Temperature	80	35	Rainfall	20.18	Snow	T

Marin County is decidedly one of water frontage, being bounded on the west and south by the Pacific Ocean and by the Golden Gate, which separates it from San Francisco by only a mile and a half at its nearest point, and on the east by San Francisco Bay.

The topographical features are rolling hills and numerous small valleys. A part of the Coast Range crosses Marin in a northwesterly and southeasterly direction, and much of the surface of the county is broken and hilly, but a considerable portion immediately on the shore is composed of marsh and overflowed lands. A part of the Coast Range crosses the county, the highest point of which is Mount Tamalpais, which has an elevation of 2,375 feet.

The principal industry is dairying, but of late years attention has been paid to fruit growing.

At Tomales are located the largest oyster beds in the state.

MARIN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	35
10 to 19 acres	54
20 to 49 acres	36
50 to 99 acres	30
100 to 174 acres	35
175 to 259 acres	40
260 to 499 acres	72
500 to 999 acres	111
1,000 acres and over	79
Total	498
Total in 1900	462

Land and Farm Areas.

Approximate land, acres	338,560
Land in farms in 1910	263,442
Land in farms in 1900	322,374
Improved land in farms in 1910	93,115
Improved land in farms in 1900	47,533
Woodland in farms	49,978
Other unimproved land	120,349

Value of all Farm Property.

Total value in 1910	$12,426,158
Total value in 1900	10,866,511
Per cent increase 1900-1910	14.4
Land in 1910	9,384,625
Land in 1900	8,330,450
Buildings in 1910	1,156,830
Buildings in 1900	914,020
Implements and machinery in 1910	343,482
Implements and machinery in 1900	207,110
Domestic animals, poultry, and bees in 1910	1,541,221
Domestic animals, poultry, and bees in 1900	1,414,931

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	24,803
Other cows	3,564
Yearling heifers	2,880
Calves	6,509
Yearling steers and bulls	567
Other steers and bulls	641
Total	39,266
Value	*$1,046,404
Horses—	
Mature horses	2,338
Yearling colts	166
Spring colts	54
Total	2,558
Value	$248,075
Mules—	
Mature mules	11
Total	11
Value	$980
Swine—	
Mature hogs	8,812
Spring pigs	7,287
Total	16,099
Value	$126,569
Sheep—	
Rams, ewes, and wethers	1,930
Spring lambs	1,025
Total	2,955
Value	$14,391

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*Includes animals, age and sex not specified.

MARIN COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Goats—	
Number	147
Value	$556
Total value all domestic animals	$1,436,975

Poultry and bees—	
Poultry of all kinds	203,277
Value	$104,178
Colonies of bees	20
Value	$68

Principal Crops.

	Acres	Bushels
Corn	52	2,061
Oats	850	31,430
Wheat	57	1,155
Barley	16	231
Dry edible beans	1	8
Potatoes	435	33,469

Hay and forage—	Acres	Tons
Timothy alone	80	200
Clover alone	80	80
Alfalfa	25	86
Other tame and cultivated grasses	3,428	5,600
Wild, salt, or prairie grasses	169	179
Grains cut green	13,055	20,787
All other hay and forage	623	11,040
Totals	17,460	37,972

Poultry products—	
Poultry raised, number	141,629
Eggs produced, dozen	1,465,911
Value poultry and eggs produced	$422,837
Honey and wax—	
Honey produced, pounds	205
Wax produced, pounds	55
Value of honey and wax produced	$49
Wool—	
Wool, fleeces shorn	2,823
Value wool and mohair produced	$2,816
Special crops—	
Potatoes, acres	435
All other vegetables, acres	117

Orchard fruits—	Number bearing trees
Apples	15,995
Apricots	1,689
Cherries	165
Peaches and nectarines	6,313
Pears	4,151
Prunes and plums	3,775
Total	32,268

Tropical fruits—	Number bearing trees
Figs	201
Lemons	26
Oranges	79
Pomeloes	5
Olives	48
Total	387

Grapevines—	
Number in bearing	115,198
Small fruits—	
Strawberries, acres	1
All others	2
Total	3

Nuts—	Number bearing trees
Almonds	151
Walnuts	61
Total	212

Irrigation.

Number of farms irrigated in 1909	6
Acres irrigated in 1909	67
Acreage enterprises were capable of irrigating in 1910	71
Acreage included in projects	71
Main ditches, number	5
Length, miles	5
Pumped wells, number	1
Cost of irrigation enterprises up to July 1, 1910	$3,380
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$47.61

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	10,000	$50,000
Mineral water, gallons	60,000	9,000
Stone, miscellaneous	-----	101,528
Total	-----	$160,528
Number of mineral springs		4

MARIPOSA COUNTY.

Date of creation, February 18, 1850.

Land area, 1,463 square miles.
County seat, Mariposa (township).
Population per square mile, 2.7.

	1890	1900	1910
Population	3,787	4,720	3,956
Population	697	1,009	654

Yosemite (Station):	Highest	Lowest		Inches		Inches
Elevation, 3,966 feet. 1916: Temperature	103	3	Rainfall	49.43	Snow	177.0

The county reaches eastward from the edge of the San Joaquin plains across the foothills far into the Sierra Nevada Mountains, its altitude varying from 300 to 13,000 feet, Mount Dana, the highest point of land, reaching an elevation of 13,627 feet.

There are about 300,000 acres of plains and lower foothills together, the latter predominating, and the balance consists of high hills and mountains; bare of timber on the plains, then scattering oak and scrub pines, then rising to immense tracts of sugar and yellow pine, fir, spruce, and cedar, and the giant sequoias of Mariposa Big Tree Grove, which contains some 427 trees, many of 35 feet in diameter and 150 to 300 feet high. The county is well provided with natural water in the Merced, Mariposa, and Chowchilla rivers. The famous Yosemite Valley is located in the eastern part of this county, at an elevation of 4,060 feet, with walls 5,000 feet higher. The Merced River flows through the valley.

There are three mining belts in the county—the Mother Lode with its offshoots, the east belt, and the copper belt.

Irrigation is practiced to some extent, water being taken from streams and mining ditches, and used with good results.

The cattle and sheep are ranged in the mountains in the summer and in the valleys and plains during the winter.

MARIPOSA COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	1
10 to 19 acres	4
20 to 49 acres	4
50 to 99 acres	21
100 to 174 acres	97
175 to 259 acres	15
260 to 499 acres	101
500 to 999 acres	51
1,000 acres and over	36
Total	330
Total in 1900	381

Land and Farm Areas.

Approximate land, acres	936,320
Land in farms in 1910	206,059
Land in farms in 1900	160,156
Improved land in farms in 1910	37,017
Improved land in farms in 1900	14,003
Woodland in farms	85,150
Other unimproved land	83,892

Value of all Farm Property.

Total value in 1910	$2,829,235
Total value in 1900	1,328,151
Per cent increase 1900-1910	113.0
Land in 1910	1,817,100
Land in 1900	752,090
Buildings in 1910	276,180
Buildings in 1900	207,640
Implements and machinery in 1910	79,403
Implements and machinery in 1900	59,960
Domestic animals, poultry, and bees in 1910	656,552
Domestic animals, poultry, and bees in 1900	308,461

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	905
Other cows	7,477
Yearling heifers	1,602
Calves	2,115
Yearling steers and bulls	1,683
Other steers and bulls	2,876
Total	16,671
Value	*$370,521

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*Includes animals, age and sex not specified.

MARIPOSA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	1,896
Yearling colts	218
Spring colts	126
Total	2,240
Value	$182,986

Mules—	
Mature mules	201
Yearling colts	46
Spring colts	49
Total	296
Value	$30,565

Asses and burros—	
Number	83
Value	$10,183

Swine—	
Mature hogs	6,160
Spring pigs	2,722
Total	8,882
Value	$46,704

Sheep—	
Rams, ewes, and wethers	877
Spring lambs	304
Total	1,181
Value	$4,409

Goats—	
Number	931
Value	$2,365
Total value all domestic animals	$647,733

Poultry and bees—	
Poultry of all kinds	12,217
Value	$8,668
Colonies of bees	34
Value	$151

Principal Crops.

	Acres	Bushels
Corn	174	2,330
Oats	55	1,100
Wheat	124	1,298
Barley	1,434	19,130
Dry edible beans	62	409
Potatoes	76	8,537

Hay and forage—	Acres	Tons
Timothy alone	65	100
Timothy and clover mixed	29	34
Clover alone	25	6
Alfalfa	28	97
Other tame and cultivated grasses	177	223
Wild, salt, or prairie grasses	685	659
Grains cut green	5,472	4,884
All other hay and forage	40	46
Total	6,521	6,049

Poultry products—	
Poultry raised, number	19,583
Eggs produced, dozen	49,728
Value poultry and eggs produced	$28,844

Honey and wax—	
Honey produced, pounds	300
Wax produced, pounds	25
Value of honey and wax produced	$51

Wool—	
Wool, fleeces shorn	356
Mohair and goat hair, fleeces shorn	154
Value wool and mohair produced	$376

Special crops—	
Potatoes, acres	76
All other vegetables, acres	193

Orchard fruits—	Number bearing trees
Apples	16,001
Apricots	233
Cherries	120
Peaches and nectarines	1,618
Pears	701
Prunes and plums	762
Total	19,461

Tropical fruits—	Number bearing trees
Figs	461
Lemons	35
Oranges	1,169
Pomeloes	1
Olives	2,711
Total	4,378

Grapevines—	
Number in bearing	28,647

Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	2
All others, acres	4
Total	7

Nuts—	Number bearing trees
Almonds	159
Walnuts	91
Total	262

Irrigation.

Number of farms irrigated in 1909	56
Acres irrigated in 1909	376
Acreage enterprises were capable of irrigating in 1910	546
Acreage included in projects	767
Main ditches, number	49
Length, miles	21
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$13,440
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$24.62

Mineral Production in 1915.

Substance	Amount	Value
Copper, pounds	38,630	$6,760
Gold	-----	385,577
Silver	-----	2,175
Stone, miscellaneous	-----	17,214
Other minerals	-----	600
Total	-----	$412,326
Number of mineral springs		4

MENDOCINO COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 3,453 square miles.	Population	17,612	20,465	23,929	------
County seat, Ukiah (city).	Population	1,627	1,850	2,136	2,600
Population per square mile, 6.9.					

	Highest	Lowest		Inches		Inches
Elevation, 620 feet. 1916: Temperature	109	20	Rainfall	34.44	Snow	15.5

Mendocino County has 100 miles of coast line. In general topography it is mountainous, with valleys lying between the mountain chains and along the coast. It, together with the counties of Humboldt and Trinity, embodies the greater part of the northern Coast Range Mountains, and contains their highest peaks and deepest canyons, fertile valleys, wooded slopes, rushing rivers, and picturesque scenery. It shares with Sonoma, Humboldt, and Del Norte the glory of the great redwood belt.

The county has a length of 85 miles from north to south, and the width is 45 miles from east to west. It is traversed the entire length by the Coast Range, which is composed of two parallel ridges. These mountains vary in height from 1,000 feet to 3,000 feet. Their lower slopes have a gentle declivity, while the higher portions are generally precipitous and furrowed with ravines and gulches. There are many small productive valleys throughout the county.

Mendocino is well watered with the numerous streams which take their rise in the mountain chain which intersects her territory. The Eel River, running north, and the Russian River, running south, have their sources in this county, and are the principal streams.

Stock raising, grazing, and wool growing are very much in evidence.

The Angora goat thrives well, the mountains being an ideal pasture.

Hops are a very prolific crop.

No irrigation is required, and crops do not suffer from drought at any time.

In the county are large tracts of redwood, and it also has a large number of mineral springs.

Orchard fruits do well and the number of apricot, cherry, peach, pear and prune trees has considerably increased the last few years.

In 1916 the number of apple trees in bearing was 61,500, apricots had increased to 3,000, cherries 5,025, peaches 15,000, pears 32,000 and prunes 45,000, compared with the year 1910.

MENDOCINO COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	42
10 to 19 acres	61
20 to 49 acres	166
50 to 99 acres	151
100 to 174 acres	334
175 to 259 acres	131
260 to 499 acres	193
500 to 999 acres	124
1,000 acres and over	154
Total	1,356
Total in 1900	1,452

Land and Farm Areas.

Approximate land, acres	2,209,920
Land in farms in 1910	721,325
Land in farms in 1900	742,924
Improved land in farms in 1910	82,578
Improved land in farms in 1900	73,907
Woodland in farms	247,758
Other unimproved land	390,989

Value of all Farm Property.

Total value in 1910	$14,659,467
Total value in 1900	8,587,516
Per cent increase 1900-1910	70.7
Land in 1910	10,774,459
Land in 1900	5,840,250

MENDOCINO COUNTY SUMMARY—Continued.

Value of All Farm Property—Continued.

Buildings in 1910	$1,816,135
Buildings in 1900	1,081,090
Implements and machinery in 1910	375,049
Implements and machinery in 1900	219,630
Domestic animals, poultry, and bees in 1910	1,693,844
Domestic animals, poultry, and bees in 1900	1,446,546

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	6,454
Other cows	9,280
Yearling heifers	3,054
Calves	3,980
Yearling steers and bulls	2,503
Other steers and bulls	4,883
Total	30,154
Value	$597,588
Horses—	
Mature horses	5,300
Yearling colts	510
Spring colts	184
Total	5,994
Value	$541,605
Mules—	
Mature mules	298
Yearling colts	10
Spring colts	1
Total	309
Value	$27,421
Asses and burros—	
Number	29
Value	$1,240
Swine—	
Mature hogs	14,600
Spring pigs	7,469
Total	22,069
Value	$102,615
Sheep—	
Rams, ewes, and wethers	88,760
Spring lambs	41,010
Total	129,770
Value	$377,121
Goats—	
Number	3,927
Value	$10,215
Total value all domestic animals	$1,657,805
Poultry and bees—	
Poultry of all kinds	56,807
Value	$34,665
Colonies of bees	441
Value	$1,374

Principal Crops.

	Acres	Bushels
Corn	533	14,454
Oats	3,087	81,959
Wheat	3,906	59,195
Barley	1,904	43,370
Dry edible beans	5	44
Potatoes	616	78,909
Hay and forage—	Acres	Tons
Timothy alone	180	228
Timothy and clover mixed	489	578
Clover alone	350	556
Alfalfa	2,401	6,253
Other tame and cultivated grasses	5,895	6,884
Wild, salt, or prairie grasses	1,164	1,178
Grains cut green	16,429	21,356
All other hay and forage	107	1,052
Totals	27,015	38,085

Poultry products—	
Poultry raised, number	64,935
Eggs produced, dozen	337,781
Value of poultry and eggs produced	$121,577
Honey and wax—	
Honey produced, pounds	6,090
Wax produced, pounds	34
Value of honey and wax produced	$667
Wool—	
Wool, fleeces shorn	149,260
Mohair and goat hair, fleeces shorn	2,315
Value wool and mohair produced	$158,918
Special crops—	
Potatoes, acres	616
All other vegetables, acres	594
Orchard fruits—	Number bearing trees
Apples	63,263
Apricots	187
Cherries	1,181
Peaches and nectarines	6,928
Pears	15,829
Prunes and plums	37,197
Total	125,282
Tropical fruits—	Number bearing trees
Figs	358
Oranges	4
Olives	7
Total	369
Grapevines—	
Number in bearing	924,191
Small fruits—	
Strawberries, acres	22
Blackberries and dewberries, acres	14
All others	21
Total	57
Nuts—	Number bearing trees
Almonds	229
Walnuts	360
Total	589

Irrigation.

Number of farms irrigated in 1909	39
Acres irrigated in 1909	371
Acreage enterprises were capable of irrigating in 1910	590
Acreage included in projects	1,365
Main ditches, number	33
Length, miles	19
Laterals, number	8
Length, miles	6
Pumped wells, number	6
Cost of irrigation enterprises up to July 1, 1910	$30,297
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$51.35

Mineral Production in 1915.

Substance	Amount	Value
Manganese ore, tons	2,858	$23,036
Stone, miscellaneous	-----	1,500
Total		$24,536
Number of mineral springs		35

MERCED COUNTY.

Date of creation, April 19, 1855.

Land area, 1,995 square miles.
County seat, Merced (city).
Population per square mile, 7.6.

	1890	1900	1910	1915 (estimated)
Population	8,085	9,215	15,148	------
Population	2,009	1,969	3,102	4,000

	Highest	Lowest		Inches		Inches
Elevation, 173 feet. 1916: Temperature	105	25	Rainfall	16.47	Snow	2.0

Merced County possesses as good land as is to be found anywhere in the San Joaquin Valley for fruit and alfalfa, but its development has been retarded by large land holdings, and grain growing has been the principal occupation. Within recent years, however, thousands of acres have been subdivided into colony lots and placed on the market.

The good roads movement is receiving its due amount of consideration in the county, and the different supervisorial districts have built several miles of new roads, with the expectation of extending them as fast as possible. The county is particularly fortunate in being able to secure a high grade of road material from the nearby rock crusher at Jasper, on the line of the Yosemite Valley Railroad, and at reasonable cost.

The creamery industry has developed so rapidly that Merced County is now one of the leading counties in the production of cream.

Merced County excels in the quantity and quality of its sweet potatoes. The fig industry is yet in its infancy, but it has been proven that the soil and climatic conditions are favorable for figs and olives, peaches and grapes.

Numerous rivers and creeks traverse the county, furnishing a natural water supply. There are two irrigation systems, one on the east side and the other on the west side of the San Joaquin River. The main canal on the east side is 65 feet wide at the bottom, and 100 feet wide on top and 10 feet deep, the carrying capacity being 4,000 cubic feet per second.

MERCED COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	86
10 to 19 acres	213
20 to 49 acres	694
50 to 99 acres	295
100 to 174 acres	165
175 to 259 acres	46
260 to 499 acres	89
500 to 999 acres	100
1,000 acres and over	167
Total	1,856
Total in 1900	999

Land and Farm Areas.

Approximate land, acres	1,276,800
Land in farms in 1910	1,162,167
Land in farms in 1900*	1,702,967
Improved land in farms in 1910	607,742
Improved land in farms in 1900	613,376
Woodland in farms	49,818
Other unimproved land	504,607

Value of all Farm Property.

Total value in 1910	$49,520,913
Total value in 1900	22,636,859
Per cent increase 1900-1910	118.8
Land in 1910	40,017,324
Land in 1900	18,449,650
Buildings in 1910	2,338,587
Buildings in 1900	984,040
Implements and machinery in 1910	804,625
Implements and machinery in 1900	501,480
Domestic animals, poultry and bees in 1910	6,330,377
Domestic animals, poultry and bees in 1900	2,701,689

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows†	19,678
Other cows	43,250
Yearling heifers	14,858
Calves	14,625
Yearling steers and bulls	11,036
Other steels and bulls	34,767
Total	150,467
Value	†$4,343,845

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*By an error the acreage was reported in 1900 as 1,702,967, instead of 1,666,973.
†Includes animals, age and sex not specified.

MERCED COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	10,308
Yearling colts	1,453
Spring colts	795
Total	12,556
Value	$1,063,537
Mules—	
Mature mules	3,673
Yearling colts	198
Spring colts	204
Total	4,075
Value	$482,209
Asses and burros—	
Number	107
Value	$17,432
Swine—	
Mature hogs	19,414
Spring pigs	10,121
Total	29,535
Value	$185,474
Sheep—	
Rams, ewes and wethers	28,044
Spring lambs	11,724
Total	39,768
Value	$152,708
Goats—	
Number	5,246
Value	$21,272
Total value all domestic animals	$6,266,477
Poultry and bees—	
Poultry of all kinds	83,998
Value	$51,943
Colonies of bees	4,072
Value	$11,957

Principal Crops.

	Acres	Bushels
Corn	1,877	52,778
Oats	19,843	338,041
Wheat	10,399	115,938
Barley	88,145	2,009,531
Kafir corn and milo maize	2,206	45,770
Dry edible beans	523	5,839
Potatoes	246	18,882

Hay and forage—	Acres	Tons
Timothy alone	5	7
Clover alone	79	317
Alfalfa	37,842	144,357
Other tame and cultivated grasses	784	680
Wild, salt, or prairie grasses	10,308	7,228
Grains cut green	19,751	20,293
All other hay and forage	148	453
Totals	68,917	173,335

Poultry products—	
Poultry raised, number	136,305
Eggs produced, dozen	454,115
Value poultry and eggs produced	$184,810
Honey and wax—	
Honey produced, pounds	204,098
Wax produced, pounds	3,150
Value of honey and wax produced	$10,993
Wool—	
Wool, fleeces shorn	46,908
Mohair and goat hair, fleeces shorn	8,400
Value wool and mohair produced	$39,400
Special crops—	
Potatoes, acres	246
Sweet potatoes, acres	2,114
All other vegetables, acres	380
Sugar beets, acres	2

Orchard fruits—	Number bearing trees
Apples	8,941
Apricots	7,381
Cherries	343
Peaches and nectarines	134,991
Pears	5,704
Prunes and plums	5,401
Total	163,013

Tropical fruits—	Number bearing trees
Figs	9,837
Lemons	209
Oranges	1,572
Pomeloes	11
Olives	6,981
Total	18,613

Grapevines—	
Number in bearing	1,281,342
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	21
All others, acres	8
Total	34

Nuts—	Number bearing trees
Almonds	17,132
Pecans	31
Walnuts	633
Total	17,845

Irrigation.

Number of farms irrigated in 1909	1,417
Acres irrigated in 1909	151,998
Acreage enterprises were capable of irrigating in 1910	248,670
Acreage included in projects	281,719
Main ditches, number	45
Length, miles	261
Laterals, number	353
Length, miles	352
Flowing wells, number	29
Pumped wells, number	78
Cost of irrigation enterprises up to July 1, 1910	$3,748,211
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$15.07

Mineral Production in 1915.

Substance	Amount	Value
Lead, pounds	690	$32
Other minerals		94,000
Total		$94,032

MODOC COUNTY.

Date of creation, February 17, 1874.

		1890	1900	1910	1915 (estimated)
Land area, 3,823 square miles.	Population	4,986	5,076	6,191	------
County seat, Alturas (town).	Population	-----	-----	916	1,500
Population per square mile, 1.6.					

		Highest	Lowest		Inches		Inches
Elevation, 4,400 feet.	1916: Temperature	99	—18	Rainfall	15.22	Snow	65.7

Modoc County is in the extreme northeastern corner of California. The county is a succession of mountain ranges and valleys branching off from the Sierra Nevada Mountains, the principal spur of which is the Warner Range. It is principally drained by Pit River, which flows into the Sacramento, near Redding, Shasta County. The lava bed section occupies over one-half the total area. The county has two large lakes, but barring the lakes and the large cattle ranges, it is sparsely settled.

The valleys are the principal features, the leading ones being the Surprise, Goose Lake, Hot Springs, Jess, Big, and the Little Hot Springs.

Wheat, barley, apples, vegetables, and hay are the leading staples. Thousands of acres are in alfalfa, and the stock and dairying industries are thriving. Snow falls in the valleys and much deeper in the mountains, forming the principal supply of moisture for the development of the country. Stock is usually fed for several months through the winter, although it is not always necessary to do so.

The county is well watered. Surprise Valley has nearly twenty streams, which run both winter and summer. Goose Lake Valley is equally fortunate, which Pit River supplies with water for many farms and ranches. Many springs exist, especially in the mountains, and in Surprise Valley there are many artesian wells.

The timber of the county is pine and fir in the Warner Range, and sugar pine in the western part.

Horticulture has had but a small place in the industries, only sufficient fruit for home uses being raised. The wild plum is about the only native fruit.

MODOC COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	5
3 to 9 acres	18
10 to 19 acres	13
20 to 49 acres	21
50 to 99 acres	44
100 to 174 acres	229
175 to 259 acres	68
260 to 499 acres	171
500 to 909 acres	92
1,000 acres and over	75
Total	736
Total in 1900	638

Land and Farm Areas.

Approximate land, acres	2,446,720
Land in farms in 1910	410,134
Land in farms in 1900	298,755
Improved land in farms in 1910	164,784
Improved land in farms in 1900	122,647
Woodland in farms	75,668
Other unimproved land	169,682

Value of all Farm Property.

Total value in 1910	$11,376,263
Total value in 1900	5,363,827
Per cent increase 1900-1910	112.1
Land in 1910	7,379,085
Land in 1900	2,825,360
Buildings in 1910	1,004,180
Buildings in 1900	521,900
Implements and machinery in 1910	365,550
Implements and machinery in 1900	174,200
Domestic animals, poultry and bees in 1910	2,627,448
Domestic animals, poultry and bees in 1900	1,842,367

MODOC COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,903
Other cows	18,502
Yearling heifers	6,937
Calves	4,608
Yearling steers and bulls	6,517
Other steers and bulls	7,449
Total	46,916
Value	$1,005,026
Horses*—	
Mature horses	12,247
Yearling colts	2,212
Spring colts	976
Total	15,636
Value	*$1,145,568
Mules—	
Mature mules	565
Yearling colts	441
Spring colts	126
Total	1,132
Value	$93,005
Asses and burros—	
Number	98
Value	$26,511
Swine—	
Mature hogs	5.328
Spring pigs	3,160
Total	8,488
Value	$53,595
Sheep—	
Rams, ewes and wethers	46,078
Spring lambs	30,484
Total	76,562
Value	$286,882
Goats—	
Number	549
Value	$2,331
Total value all domestic animals	$2,612,918
Poultry and bees—	
Poultry of all kinds	23,789
Value	$11,466
Colonies of bees	839
Value	$3,064

Principal Crops.

	Acres	Bushels
Corn	6	209
Oats	728	22,138
Wheat	9,362	195,924
Barley	8,650	227,473
Dry edible beans	88	1,567
Potatoes	346	44,614

Hay and forage—	Acres	Tons
Timothy alone	1,512	3,662
Timothy and clover mixed	5,754	10,195
Alfalfa	10,869	24,480
Other tame and cultivated grasses	3,227	5,373
Wild, salt, or prairie grasses	50,579	70,143
Grains cut green	3,496	4,992
All other hay and forage	42	61
Totals	75,479	118,906

Poultry products—	
Poultry raised, number	38,112
Eggs produced, dozen	134,731
Value poultry and eggs produced	$48,337
Honey and wax—	
Honey produced, pounds	19,796
Wax produced, pounds	232
Value of honey and wax produced	$2,055
Wool—	
Wool, fleeces shorn	39,538
Mohair and goat hair, fleeces shorn	1,356
Value wool and mohair produced	$55,583
Special crops—	
Potatoes, acres	346
All other vegetables, acres	549
Sugar beets, acres	9

Orchard fruits—	Number bearing trees
Apples	28,969
Apricots	652
Cherries	963
Peaches and nectarines	2,113
Pears	1,888
Prunes and plums	3,182
Total	37,776

Grapevines—	
Number in bearing	795
Small fruits—	
Strawberries, acres	9
Blackberries and dewberries, acres	9
All others, acres	19
Total	37

Nuts—	Number bearing trees
Walnuts	3

Irrigation.

Number of farms irrigated in 1909	437
Acres irrigated in 1909	82,075
Acreage enterprises were capable of irrigating in 1910	89,476
Acreage included in projects	124,166
Main ditches, number	446
Length, miles	637
Laterals, number	490
Length, miles	175
Flowing wells, number	45
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$301,040
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$3.36

Mineral Production in 1915.

Substance	Value
Gold	$7,557
Silver	104
Stone, miscellaneous	300
Other minerals	720
Total	$8,681
Number of mineral springs	18

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*Includes animals, age and sex not specified.

MONO COUNTY.

Date of creation, April 24, 1861.

		1890	1900	1910
Land area, 3,030 square miles.	Population	2,002	2,167	2,042
County seat, Bridgeport, township.	Population	335	373	312

Population per square mile, 0.7.

	Highest	Lowest		Inches		Inches
Elevation, 6,500 feet. 1916: Temperature	89	—36	Rainfall	13.41	Snow	173.0

Mono is a long, narrow county lying on the eastern slope of the Sierras, its greatest length bordering on the state of Nevada, which forms its northeastern boundary, its general direction being northeast and northwest.

The general contour is mountainous and very rough, all but 400 square miles, or less, being mountainous. The western portion lies among the Sierra Nevada Mountains, along their summit, the heights being clad in snow, and the slopes of the range being covered with forest trees.

Among the highest peaks are Mount Dana, 13,627 feet; Mount Lyell, 13,217 feet, and Castle Pass, 13,000 feet. The greater portion of the population is in the eastern part, in the valleys and the mining camps in the surrounding mountains. This portion, which has always been considered a strange, mysterious country, is of a desert-like, volcanic character, abounding in salt pools, alkali, and volcanic table-lands.

Mono Lake, the ''Dead Sea of America,'' is one of the attractions, and is situated in the center of the county; it is about 12 miles long and 8 miles wide; its waters are somewhat unusually compound, various chemical substances being found in solution in them. The lake has a number of small streams flowing into it, but is without perceptible outlet.

Owens River in the south, which takes its rise in a high peak in the Sierra, and Kitten and Walker rivers in the north, are the principal streams. One passes through the southern part into Inyo County. The other, after rising in Mono County, continues its course into the state of Nevada. These two streams with their branches, together with the small streams that flow into Mono Lake, furnish the principal water supply for irrigation.

Grazing is the leading industry, and the pasturage is good and plentiful. Herds of dairy cattle are moving from the valleys during the summer. Large bands of sheep are also driven to its mountains for summer pasturage.

The timber belt is very large and the product of good, marketable quality, but as there is no means of transportation, the development of the lumber interests is retarded, although considerable quantities are used for local mining purposes.

Mining for gold is carried on, the leading camp being Bodie.

MONO COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	3
10 to 19 acres	1
20 to 49 acres	1
50 to 99 acres	4
100 to 174 acres	27
175 to 259 acres	12
260 to 499 acres	16
500 to 999 acres	10
1,000 acres and over	17
Total	91
Total in 1900	112

Land and Farm Areas.

Approximate land, acres	1,939,200
Land in farms in 1910	115,672
Land in farms in 1900	186,063
Improved land in farms in 1910	43,382
Improved land in farms in 1900	65,238
Woodland in farms	8,303
Other unimproved land	63,987

Value of all Farm Property.

Total value in 1910	$2,347,797
Total value in 1900	1,175,743
Per cent increase 1900-1910	99.7
Land in 1910	1,587,813
Land in 1900	519,040
Buildings in 1910	154,700
Buildings in 1900	87,380
Implements and machinery in 1910	45,345
Implements and machinery in 1900	26,340
Domestic animals, poultry and bees in 1910	559,939
Domestic animals, poultry and bees in 1900	542,983

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	450
Other cows	2,270
Yearling heifers	803
Calves	666
Yearling steers and bulls	685
Other steers and bulls	427
Total	5,301
Value	$107,941
Horses—	
Mature horses	1,655
Yearling colts	310
Spring colts	132
Total	2,097
Value	$175,884
Mules—	
Mature mules	73
Yearling colts	46
Spring colts	17
Total	136
Value	$11,535
Asses and burros—	
Number	62
Value	$1,630
Swine—	
Mature hogs	179
Spring pigs	244
Total	423
Value	$2,766
Sheep—	
Rams, ewes and wethers	40,805
Spring lambs	22,241
Total	63,046
Value	$256,477
Goats—	
Number	25
Value	$77
Total value all domestic animals	$556,310
Poultry and bees—	
Poultry of all kinds	2,515
Value	$1,584
Colonies of bees	438
Value	$2,045

Principal Crops.

	Acres	Bushels
Corn	4	160
Oats	42	3,000
Wheat	167	2,739
Dry edible beans	5	133
Potatoes	97	12,094

Hay and forage—	Acres	Tons
Timothy and clover mixed	2,278	2,720
Clover alone	4	10
Alfalfa	2,086	6,685
Other tame and cultivated grasses	70	97
Wild, salt, or prairie grasses	2,494	2,576
All other hay and forage	15	30
Totals	6,947	12,118

Poultry products—	
Poultry raised, number	2,559
Eggs produced, dozen	4,541
Value poultry and eggs produced	$2,988
Honey and wax—	
Honey produced, pounds	20,355
Wax produced, pounds	425
Value honey and wax produced	$2,049
Wool—	
Wool, fleeces shorn	29,160
Value wool and mohair produced	$41,209
Special crops—	
Potatoes, acres	97
All other vegetables, acres	36

Orchard fruits—	Number bearing trees
Apples	1,088
Apricots	6
Cherries	197
Peaches and nectarines	91
Pears	123
Prunes and plums	86
Total	1,595

Grapevines—	
Number in bearing	2,000
Small fruits, acres	1

MONO COUNTY SUMMARY—Continued.

Irrigation.

Number of farms irrigated in 1909	76
Acres irrigated in 1909	49,027
Acreage enterprises were capable of irrigating in 1910	50,007
Acreage included in projects	84,973
Main ditches, number	85
Length, miles	172
Laterals, number	101
Length, miles	65
Cost of irrigation enterprises up to July 1, 1910	$64,282
Average cost per acre irrigation enterprises were capable of irrigating in 1910	1.29

Mineral Production in 1915.

Substance	Value
Gold	$107,302
Silver	1,923
Other minerals	200
Total	$109,425
Number of mineral springs	20

MONTEREY COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 3,330 square miles.	Population	18,637	19,380	24,146	------
County seat, Salinas (city).	Population	2,339	3,304	3,736	5,000

Population per square mile, 7.3.

	Highest	Lowest		Inches		Inches
Elevation, 40 feet. 1916: Temperature	88	25	Rainfall	18.81	Snow	0

Monterey County is situated about 100 miles south of San Francisco and 300 miles north of Los Angeles, on the Pacific Ocean. It is 124 miles long and 45 miles wide, its extreme length being from north to south.

The county is divided into three sections—the mountains and hills on the east, mountains and hills on the west, and the great Salinas Valley situated between these ranges of mountains.

The portion of Pajaro Valley lying south of the Pajaro River and running to Monterey Bay on the southwest is in Monterey County, and is about 15 miles long and from 6 to 8 miles wide. The land is exceedingly fertile and under a thorough system of cultivation, producing large crops of all kinds of vegetables, grain, fruit, and berries.

There is a considerable acreage in sugar beets, and the largest sugar factory in the state is situated near Salinas City, having a daily slicing capacity of 3,000 tons.

Going south, barley excels, and prunes, apricots, cherries, and almonds grow to perfection in the foothills, canyons, and small valleys.

Currants, gooseberries, blackberries, loganberries and raspberries grow well. Strawberries are in the market most of the year, and are shipped from Pajaro by carloads.

Dairying is very important, if not a leading industry. Some of the finest dairies in the state are in Monterey County, and some of the best cheese and butter in the state are made here.

In the harbor of Monterey Bay the largest battleships of our navy find anchorage within 100 feet of the shore. The fishing industry is an important one, especially for sardines. The two packing houses at Monterey packed 7,500,000 pounds of these fish in 1914. More than two-thirds of the abalone catch of the state also comes from this bay. In 1916 the output of abalone was 828 dozen of fresh, and 5,889 cases of canned abalone, of 48 cans to the case. The quality has improved greatly during the past two or three years.

MONTEREY COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	11
3 to 9 acres	69
10 to 19 acres	71
20 to 49 acres	182
50 to 99 acres	185
100 to 174 acres	263
175 to 259 acres	127
260 to 499 acres	282
500 to 999 acres	225
1,000 acres and over	243
Total	1,658
Total in 1900	1,850

Land and Farm Areas.

Approximate land, acres	2,131,200
Land in farms in 1910	1,147,416
Land in farms in 1900	1,087,032
Improved land in farms in 1910	371,509
Improved land in farms in 1900	373,605
Woodland in farms	140,377
Other improved land	635,530

MONTEREY COUNTY SUMMARY—Continued.

Value of all Farm Property.

Total value in 1910	$35,021,930
Total value in 1900	19,409,742
Per cent increase 1900-1910	80.4
Land in 1910	27,885,000
Land in 1900	15,632,700
Buildings in 1910	2,178,728
Buildings in 1900	1,353,700
Implements and machinery in 1910	811,886
Implements and machinery in 1900	502,400
Domestic animals, poultry and bees in 1910	4,146,316
Domestic animals, poultry and bees in 1900	1,920,942

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	14,066
Other cows	27,626
Yearling heifers	11,046
Calves	13,806
Yearling steers and bulls	7,502
Other steers and bulls	13,133
Total	88,889
Value	$2,079,939
Horses*—	
Mature horses	14,172
Yearling colts	1,993
Spring colts	1,268
Total	17,444
Value	*$1,676,690
Mules—	
Mature mules	546
Yearling colts	66
Spring colts	30
Total	642
Value	$85,550
Asses and burros—	
Number	26
Value	$5,256
Swine—	
Mature hogs	12,567
Spring pigs	7,464
Total	20,031
Value	$119,455
Sheep—	
Rams, ewes and wethers	17,029
Spring lambs	11,845
Total	28,874
Value	$91,991
Goats—	
Number	3,983
Value	$10,976
Total value all domestic animals	$4,069,857
Poultry and bees—	
Poultry of all kinds	128,325
Value	$63,260
Colonies of bees	3,669
Value	$13,199

Principal Crops.

	Acres	Bushels
Corn	845	15,552
Oats	8,734	240,760
Wheat	22,924	298,080
Barley	98,923	2,026,334
Kafir corn and milo maize	2	40
Dry edible beans	1,504	29,532
Potatoes	5,393	364,468
Hay and forage—	Acres	Tons
Clover alone	60	90
Alfalfa	2,819	8,251
Other tame and cultivated grasses	610	1,215
Wild, salt, or prairie grasses	6,211	5,582
Grains cut green	73,492	93,147
All other hay and forage	455	1,563
Totals	83,647	109,848

Poultry products—	
Poultry raised, number	123,743
Eggs produced, dozen	751,177
Value of poultry and eggs produced	$231,683
Honey and wax—	
Honey produced, pounds	177,279
Wax produced, pounds	2,619
Value of honey and wax produced	$14,708
Wool—	
Wool, fleeces shorn	24,884
Mohair and goat hair, fleeces shorn	3,000
Value wool and mohair produced	$26,549
Special crops—	
Potatoes, acres	5,393
All other vegetables, acres	658
Sugar beets, acres	9,900
Orchard fruits—	Number bearing trees
Apples	290,404
Apricots	27,996
Cherries	1,729
Peaches and nectarines	7,381
Pears	5,194
Prunes and plums	6,189
Total	339,105
Tropical fruits—	Number bearing trees
Figs	217
Lemons	7
Oranges	29
Olives	657
Total	913
Grapevines—	
Number in bearing	79,935
Small fruits—	
Strawberries, acres	263
Blackberries and dewberries, acres	56
All others, acres	88
Total	407
Nuts—	Number bearing trees
Almonds	2,196
Pecans	3
Walnuts	306
Total	2,505

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*Includes animals, age and sex not specified.

Irrigation.

Number of farms irrigated in 1909	258
Acres irrigated in 1909	15,056
Acreage enterprises were capable of irrigating in 1910	27,176
Acreage included in projects	29,914
Main ditches, number	106
Length, miles	223
Laterals, number	23
Length, miles	32
Pumped wells, number	102
Cost of irrigation enterprises up to July 1, 1910	$495,916
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$18.25

Mineral Production in 1915.

Substance	Amount	Value
Mineral water, gallons	8,200	$2,050
Stone	------	32,799
Other minerals†	------	50,137
Total		$84,986
Number of mineral springs		8

†Includes coal, feldspar, infusorial earth, quicksilver, silica.

NAPA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 783 square miles.	Population	16,411	16,451	19,800	------
County seat, Napa (city).	Population	4,395	4,036	5,791	6,500

Population per square mile, 25.3.

St. Helena (Station):	Temperature Highest	Temperature Lowest	Rainfall Inches	Snow Inches
Elevation, 255 feet. 1916:	108	25	43.51	7.0

The principal resources of Napa County are the raising of grapes, the making of wine and of grape juice; raising of prunes, peaches, pears, plums, and other fruit, and growing of grain. The county is also one of the few producing hops on a commercial scale. The value of mineral products is also considerable. There is a large cement manufactory at Napa Junction.

Napa County has the great advantage of river transportation to the bay of San Francisco, passenger and freight steamers making daily trips between Napa and San Francisco.

No irrigation is required to produce any crops.

Its southern boundary reaches down to within twenty-nine miles of San Francisco. The Napa River, a short tidal stream which drains the great Napa Valley, is navigable to the heart of the city of Napa.

There are many large creeks, brooks, and many springs in the hills, both mineral and otherwise.

(*Information supplied by the Horticultural Commissioner*).

Since 1910, hundreds of acres of fruit have come into bearing and hundreds of acres have been set out. The plantings are chiefly confined to prunes and pears, which are the chief commercial crops of the county in agriculture. Grapes are the premier crop, there being some 13,000 acres of dry wine grapes in bearing. About two-thirds of the country taxes of the county are said to come out of the vineyards.

Large areas are being cut up and planted to trees, or are being farmed on a more scientific plan—the grain farms, *per se,* becoming a thing of the past. Farmers in certain sections are also reviving their interest in sheep and this is bound to improve the farms where they are kept.

Peach orchards are on the decline, apples about stationary, but good prune land is being rapidly planted up and few first-class prune orchards in full bearing are for sale. A considerable acreage of pears will be planted this year, also.

Dairying is on the increase in the county. The Napa State Hospital has recently completed a 200-cow plant, and about a dozen silos have been installed by different men the past two or three years. A cow testing association is organized for the purpose of improving the herds.

Napa County has no bonded indebtedness.

Napa beef cattle number about 10,000.

Sheep and swine about 20,000.

NAPA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	14
3 to 9 acres	136
10 to 19 acres	223
20 to 49 acres	355
50 to 99 acres	226
100 to 174 acres	223
175 to 259 acres	92
260 to 499 acres	112
500 to 999 acres	84
1,000 acres and over	72
Total	1,537
Total in 1900	1,336

Land and Farm Areas.

Approximate land, acres	501,120
Land in farms in 1910	360,580
Land in farms in 1900	319,327
Improved land in farms in 1910	101,114
Improved land in farms in 1900	111,966
Woodland in farms	193,578
Other unimproved land	65,888

Value of all Farm Property.

Total value in 1910	$18,082,006
Total value in 1900	12,337,046
Per cent increase 1900-1910	46.6
Land in 1910	13,086,656
Land in 1900	8,925,780
Buildings in 1910	3,365,470
Buildings in 1900	2,181,590
Implements and machinery in 1910	500,921
Implements and machinery in 1900	357,980
Domestic animals, poultry, and bees in 1910	1,128,959
Domestic animals, poultry, and bees in 1900	871,696

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	6,270
Other cows	3,945
Yearling heifers	1,403
Calves	2,518
Yearling steers and bulls	758
Other steers and bulls	937
Total	15,866
Value	*$395,721
Horses—	
Mature horses	5,145
Yearling colts	528
Spring colts	237
Total	5,910
Value	$540,055
Mules—	
Mature mules	345
Yearling colts	18
Spring colts	9
Total	372
Value	$37,970
Asses and burros—	
Number	10
Value	$1,315
Swine—	
Mature hogs	5,160
Spring pigs	3,184
Total	8,344
Value	$51,330
Sheep —	
Rams, ewes, and wethers	5,794
Spring lambs	5,084
Total	10,878
Value	$37,076
Goats—	
Number	556
Value	$1,873
Total value all domestic animals	$1,065,340
Poultry and bees—	
Poultry of all kinds	108,777
Value	$61,777
Colonies of bees	524
Value	$1,842

Principal Crops.

	Acres	Bushels
Corn	2,389	59,579
Oats	1,366	32,155
Wheat	4,134	50,671
Barley	3,048	58,300
Kafir corn and milo maize	2	35
Dry edible beans	6	61
Potatoes	530	81,659

Hay and forage—	Acres	Tons
Timothy and clover mixed	10	15
Clover alone	29	55
Alfalfa	1,204	3,423
Other tame and cultivated grasses	496	413
Wild, salt, or prairie grasses	393	627
Grains cut green	23,764	34,503
All other hay and forage	165	295
Totals	26,061	39,331

Poultry products—	
Poultry raised, number	105,428
Eggs produced, dozen	662,153
Value poultry and eggs produced	$218,003
Honey and wax—	
Honey produced, pounds	8,939
Wax produced, pounds	204
Value of honey and wax produced	$942
Wool—	
Wool, fleeces shorn	9,955
Mohair and goat hair, fleeces shorn	153
Value wool and mohair produced	$7,196
Special crops—	
Potatoes, acres	530
All other vegetables, acres	428

Orchard fruits—	Number bearing trees
Apples	41,301
Apricots	16,953
Cherries	16,955
Peaches and nectarines	71,080
Pears	50,210
Prunes and plums	299,613
Total	497,391

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*Includes animals, age and sex not specified.

NAPA COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Tropical fruits—	Number bearing trees
Figs	1,234
Lemons	258
Oranges	1,192
Pomeloes	9
Olives	20,176
Total	23,251

Grapevines—	
Number in bearing	8,595,338

Small fruits—	
Strawberries, acres	22
Blackberries and dewberries, acres	26
All others, acres	11
Total	59

Nuts—	Number bearing trees
Almonds	1,325
Pecans	10
Walnuts	1,105
Total	2,768

Irrigation.

Number of farms irrigated in 1909	36
Acres irrigated in 1909	1,191
Acreage enterprises were capable of irrigating in 1910	2,035
Acreage included in projects	2,443
Main ditches, number	26
Length, miles	8
Laterals, number	3
Length, miles	3
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$53,948
Average cost per acre irrigation enterprises were capable of irrigating in 1910	26.51

Mineral Production in 1915.

Substance	Amount	Value
Magnesite, tons	1,050	$9,450
Mineral water, gallons	133,387	73,535
Quicksilver, flasks	507	45,224
Stone, miscellaneous	------	108,387
Other minerals*	------	647,625
Total	------	$884,221
Number mineral springs		14

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*Includes cement and sandstone.

NEVADA COUNTY.

Date of creation, April 25, 1851.

		1890	1900	1910	1915 (estimated)
Land area, 974 square miles.	Population	17,369	17,789	14,955	------
County seat, Nevada City.	Population	2,524	3,250	2,689	3,000
Population per square mile, 15.4.					

	Highest	Lowest		Inches		Inches
Elevation, 2,850 feet. 1916: Temperature	98	9	Rainfall	57.33	Snow	81.5

Nevada County is situated in that portion of the state generally known as northern California, although its county seat, Nevada City, is but 60 miles from Sacramento. It is bounded on the north by Sierra County, on the east by the state line between California and Nevada, on the south by Placer County, and on the west by Yuba County. From the Yuba County line, Nevada County is hemmed in by the Yuba and Bear rivers until their sources are reached. The South Yuba River heads in the high Sierras and runs across the county almost its entire length from east to west.

On the rolling foothills of the western portion, where snow and frost are seldom seen, the elevation is slightly above the sea level, while along the eastern boundaries rise the snow-capped peaks of the Sierra Nevada to an elevation of nearly 8,000 feet.

In the Chicago Park section, between Colfax and Grass Valley, the soil is particularly adapted to the culture of Bartlett pears and Hungarian prunes, both of which are grown without irrigation.

In the southwestern portion of the county, where there is an abundance of water, the farmers are turning their attention to dairying.

In the production of gold, Nevada County since 1849 has been a continual producer. Some of the mines are working at a depth of 4,000 feet, and have proven conclusively that in every instance where depth has been attained the ore bodies and the values are equally distributed.

NEVADA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	61
10 to 19 acres	36
20 to 49 acres	77
50 to 99 acres	60
100 to 174 acres	88
175 to 259 acres	53
260 to 499 acres	84
500 to 999 acres	41
1,000 acres and over	28
Total	544
Total in 1900	522

Land and Farm Areas.

Approximate land, acres	623,360
Land in farms in 1910	175,398
Land in farms in 1900	120,743
Improved land in farms in 1910	24,542
Improved land in farms in 1900	24,898
Woodland in farms	48,449
Other unimproved land	102,407

Value of all Farm Property.

Total value in 1910	$3,022,685
Total value in 1900	1,947,540
Per cent increase 1900-1910	55.2
Land in 1910	1,817,417
Land in 1900	1,116,960
Buildings in 1910	661,400
Buildings in 1900	447,640
Implements and machinery in 1910	132,857
Implements and machinery in 1900	102,910
Domestic animals, poultry and bees in 1910	408,011
Domestic animals, poultry and bees in 1900	280,030

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,395
Other cows	2,950
Yearling heifers	832
Calves	1,069
Yearling steers and bulls	495
Other steers and bulls	865
Total	8,606
Value	$174,067

NEVADA COUNTY SUMMARY—Continued.

Horses*—	
Mature horses	1,830
Yearling colts	124
Spring colts	70
Total	2,074
Value	*$161,139
Mules—	
Mature mules	57
Yearling colts	11
Total	68
Value	$5,945
Asses and burros—	
Number	10
Value	$205
Swine—	
Mature hogs	1,067
Spring pigs	749
Total	1,816
Value	$12,602
Sheep—	
Rams, ewes and wethers	6,853
Spring lambs	4,309
Total	11,162
Value	$34,960
Goats—	
Number	2,198
Value	$4,736
Total value all domestic animals	$393,204
Poultry and bees—	
Poultry of all kinds	23,482
Value	$13,731
Colonies of bees	260
Value	$1,076

Principal Crops.

	Acres	Bushels
Corn	5	208
Oats	119	1,559
Wheat	95	1,279
Barley	30	249
Dry edible beans	1	18
Potatoes	106	12,733

Hay and forage—	Acres	Tons
Timothy alone	55	56
Timothy and clover mixed	267	390
Clover alone	221	459
Alfalfa	492	1,114
Other tame and cultivated grasses	887	1,489
Wild, salt, or prairie grasses	1,706	1,685
Grains cut green	5,068	4,191
All other hay and forage	29	113
Totals	8,725	9,497

Poultry products—	
Poultry raised, number	35,776
Eggs produced, dozen	150,596
Value poultry and eggs produced	$63,612
Honey and wax—	
Honey produced, pounds	5,452
Wax produced, pounds	42
Value of honey and wax produced	$779

Wool—	
Wool, fleeces shorn	10,607
Mohair and goat hair, fleeces shorn	1,043
Value wool and mohair produced	$8,382
Special crops—	
Potatoes, acres	106
Sweet potatoes, acres	1
All other vegetables, acres	231
Sugar beets, acres	39

Orchard fruits—	Number bearing trees
Apples	20,223
Apricots	193
Cherries	1,727
Peaches and nectarines	17,873
Pears	36,800
Prunes and plums	6,955
Total	84,259

Tropical fruits—	Number bearing trees
Figs	1,468
Lemons	6
Oranges	364
Pomeloes	2
Olives	419
Total	2,311

Grapevines—	
Number in bearing	94,338
Small fruits—	
Strawberries, acres	4
Blackberries and dewberries, acres	15
All others, acres	36
Total acres	55

Nuts—	Number bearing trees
Almonds	1,325
Pecans	10
Walnuts	1,105
Total	2,768

Irrigation.

Number of farms irrigated in 1909	300
Acres irrigated in 1909	3,839
Acreage enterprises were capable of irrigating in 1910	4,259
Acreage included in projects	5,267
Main ditches, number	110
Length, miles	236
Laterals, number	46
Length, miles	32
Pumped wells, number	5
Cost of irrigation enterprises up to July 1, 1910	$1,569,028
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$368.40

Mineral Production in 1915.

Substance	Amount	Value
Copper, pounds	1,817	$318
Gold		3,466,722
Lead, pounds	1,567	74
Silver		23,762
Stone, miscellaneous		500
Other minerals		1,570
Total		$3,492,946
Number of mineral springs		1

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*Includes animals, age and sex not specified.

ORANGE COUNTY.

Date of creation, March 11, 1889.

		1890	1900	1910	1916 (estimated)
Land area, 795 square miles.	Population	13,589	19,696	34,436	------
County seat, Santa Ana (city).	Population	1,456	3,628	8,429	10,627

Population per square mile, 43.3.

Yorba Linda (Station):

	Temperature Highest	Lowest	Rainfall Inches	Snow Inches
Elevation, 105 feet. 1916:	101	29	22.42	6.0

Orange County is bounded on the north by Los Angeles County, on the east by San Bernardino and Riverside counties, on the south by San Diego County, and on the west by the Pacific Ocean. The Santa Ana River enters the county on the northeast boundary and empties into Newport Bay, furnishing irrigating water to the Anaheim Union Water Company and Santa Ana Valley Irrigating Company. The Santiago Creek furnishes water to and along the foothills east of Orange.

San Juan by the Sea, Arch Beach, and Laguna Beach are open coast resorts. Corona del Mar, East Newport, Balboa, Newport Beach, and Port Orange are situated on Newport Bay, which is the best shipping point of the county. The county is one of the largest producers of oranges, of which a large acreage has been planted in recent years. There is also a considerable acreage in olives. The first raisin grapevines in southern California were planted in this county by McPherson Bros. in 1872, and the first raisins produced in 1875, but the vines were killed in 1888 by the Anaheim disease.

The county is one of the largest producers of Lima beans, and also of sugar beets and, at one time, of celery; the acreage in the latter is being reduced, as growers find that beans and sugar beets pay better.

(*Information supplied by the Chamber of Commerce.*)

These estimates are made after a thoroughly careful investigation. For illustration, take oranges: we let the orange shippers of the county make the estimate; for oil and gasoline, we take our county assessor's figures, and there are only one or two of the smaller ones that may be slightly exaggerated; for illustration, bees and honey may be a little large; the tomato seed also may be a few thousand dollars too high, but outside of those, the balance of the statement is authentic. So take it all in all the 1916 figures as given are as nearly correct as is possible for any agency to get them, and we are willing to stand back of the estimate, knowing that an investigation will prove it, and that our total estimate will probably be one million dollars too small.

Estimated Value of Important Products for 1916.

Apricots	$25,000
Apples	20,000
Avocados (alligator pears)	6,500
Beans (90 per cent Limas)	2,500,000
Bees and honey	50,000
Beet sugar (by-products)	1,000,000
Berries (all kinds)	75,000
Butter	25,000
Celery	100,000
Cream	50,000
Fish (salt water)	50,000
Fruits (miscellaneous)	300,000
Gas (natural, for fuel and lights)	1,750,000
Gasoline (manufactured from natural gas)	3,000,000
Grain (barley, corn, etc.)	750,000
Hay (alfalfa, barley, oat, bean)	1,250,000
Lemons	971,605
Livestock (all kinds)	$850,000
Oil (crude)	10,500,000
Oil (olive)	100,000
Olives (pickles)	50,000
Oranges (90 per cent Valencias)	4,773,218
Peppers	250,000
Poultry and eggs	1,500,000
Potatoes (Irish)	650,000
Potatoes (sweet)	200,000
Sugar (beet)	7,750,000
Tomatoes	150,000
Tomato seed	50,000
Vegetables (miscellaneous)	200,000
Walnuts	1,600,000
Wine and beer	200,000
Total	$40,746,323

ORANGE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	28
3 to 9 acres	531
10 to 19 acres	802
20 to 49 acres	1,043
50 to 99 acres	351
100 to 174 acres	175
175 to 259 acres	60
260 to 499 acres	86
500 to 999 acres	52
1,000 acres and over	37
Total	3,165
Total in 1900	2,388

Land and Farm Areas.

Approximate land, acres	508,800
Land in farms in 1910	*371,692
Land in farms in 1900	599,436
Improved land in farms in 1910	189,463
Improved land in farms in 1900	236,847
Woodland in farms	4,476
Other unimproved land	177,753

Value of all Farm Property.

Total value in 1910	$64,357,852
Total value in 1900	22,346,595
Per cent increase 1900-1910	188.0
Land in 1910	55,952,755
Land in 1900	18,533,640
Buildings in 1910	4,660,795
Buildings in 1900	2,177,040
Implements and machinery in 1910	1,148,222
Implements and machinery in 1900	456,500
Domestic animals, poultry, and bees in 1910	2,596,080
Domestic animals, poultry, and bees in 1900	1,179,415

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	6,184
Other cows	4,473
Yearling heifers	2,124
Calves	2,231
Yearling steers and bulls	1,168
Other steers and bulls	2,040
Total	18,220
Value	$506,811
Horses—	
Mature horses	9,580
Yearling colts	760
Spring colts	225
Total	10,565
Value	$1,338,440
Mules—	
Mature mules	2,223
Yearling colts	38
Spring colts	7
Total	2,268
Value	$396,360
Asses and burros—	
Number	25
Value	$1,195
Swine—	
Mature hogs	2,265
Spring pigs	2,183
Total	4,448
Value	$32,959
Sheep—	
Rams, ewes, and wethers	31,802
Spring lambs	11,876
Total	43,678
Value	$176,893
Goats—	
Number	423
Value	$1,220
Total value all domestic animals	$2,453,878
Poultry and bees—	
Poultry of all kinds	186,746
Value	$125,423
Colonies of bees	5,159
Value	$16,779

Principal Crops.

	Acres	Bushels
Corn	3,054	91,643
Oats	995	30,858
Wheat	793	10,797
Barley	27,384	671,526
Kafir corn and milo maize	189	3,557
Dry edible beans	21,186	402,951
Potatoes	1,770	127,367

Hay and forage—	Acres	Tons
Alfalfa	5,304	23,139
Other tame and cultivated grasses	6,128	8,177
Wild, salt, or prairie grasses	65	65
Grains cut green	35,753	53,045
All other hay and forage	401	3,229
Totals	47,651	87,655

Poultry products—	
Poultry raised, number	239,563
Eggs produced, dozen	1,198,290
Value poultry and eggs produced	$414,692
Honey and wax—	
Honey produced, pounds	325,656
Wax produced, pounds	2,764
Value of honey and wax produced	$18,525
Wool—	
Wool, fleeces shorn	62,072
Value of wool and mohair produced	$51,474
Special crops—	
Potatoes, acres	1,770
Sweet potatoes, acres	484
All other vegetables, acres	3,785
Sugar beets, acres	10,275

Orchard fruits—	Number bearing trees
Apples	11,992
Apricots	129,352
Cherries	23
Peaches and nectarines	12,461
Pears	2,100
Prunes and plums	4,569
Total	160,667

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*By an error the acreage was reported in 1900 as 599,436, instead of 425,277.

ORANGE COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Tropical fruits—	Number bearing trees
Figs	1,066
Lemons	46,954
Oranges	478,272
Pomeloes	677
Olives	67,046
Total	597,383

Grapevines—	
Number in bearing	282,682

Small fruits—	
Strawberries, acres	76
Blackberries and dewberries, acres	43
All others, acres	86
Total	205

Nuts—	Number bearing trees
Almonds	11,539
Pecans	2
Walnuts	535
Total	12,076

Irrigation.

Number of farms irrigated in 1909	2,215
Acres irrigated in 1909	55,056
Acreage enterprises were capable of irrigating in 1910	63,486
Acreage included in projects	71,444
Main ditches, number	309
Length, miles	180
Laterals, number	115
Length, miles	246
Flowing wells, number	588
Pumped wells, number	580
Cost of irrigation enterprises up to July 1, 1910	$1,948,246
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$30.69

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	1,280	$16,000
Copper, pounds	4	1
Lead, pounds	364	17
Natural gas, M cu. ft.	1,243,301	81,753
Petroleum, barrels	12,715,457	6,510,314
Stone, miscellaneous	--------	9,027
Total	--------	$6,617,112
Number mineral springs		2

PLACER COUNTY.

Date of creation, April 25, 1851.

		1890	1900	1910	1915 (estimated)
Land area, 1,395 square miles.	Population	15,101	15,786	18,237	------
County seat, Auburn (city).	Population	1,595	2,050	2,376	2,366

Population per square mile, 13.1.

		Highest	Lowest		Inches		Inches
Elevation, 1,360 feet.	1916: Temperature	103	24	Rainfall	32.77	Snow	9.5

Placer County is about 100 miles long and of varying widths, from 10 to 30 miles, the course and distance being defined by the course of the rivers which mark its boundaries. It extends from about eight miles from the Sacramento River to the summit of the Sierra Nevada Mountains. Just above Auburn, between the Bear and American rivers, the county is very narrow, being about eight miles across. Above Auburn it widens out into the two divides lying between the Bear River and the Middle Fork of the American River. These are known as the Dutch Flat, or Railroad Divide, and the Forest Hill Divide. The southwestern portion is more regular in shape than the part just described. This section contains the foothill and level argicultural lands.

The entire extent faces toward the west, extending from an altitude of some 40 feet on the plains in the western portion to over 7,000 feet at its eastern boundary line. At the eastern boundary, separating it from the state of Nevada, is Lake Tahoe, one of the most picturesque lakes in America.

The soil of the western, or valley, portion is of the same general alluvial composition as all the soil in the Sacramento Valley, and is well adapted to the growth of grain. The low foothills near Lincoln are excellent for the grape.

Placer County holds a foremost position among the fruit producers. Peaches have been grown for years, and oranges and olives are also produced. In the production of cherries, small fruits, berries, and table grapes, Placer holds a foremost place.

The olive industry is a successful one in this county and both olive oil and pickled olives of high quality are produced here. The olive crop of 1916 was probably 30 per cent lower than the previous year.

Dairying and stock and poultry raising are successful industries. Butter making is carried on in the summer, the mountain ranges providing plenty of natural feed for cattle.

Much sugar and yellow pine, fir, spruce, and cedar are found in the mountains, and the lumber output from that section has been very large for many years. Oak and scrub pine abound all over the foothills and fuel is plentiful.

PLACER COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	2
3 to 9 acres	52
10 to 19 acres	109
20 to 49 acres	289
50 to 99 acres	206
100 to 174 acres	174
175 to 259 acres	69
260 to 499 acres	75
500 to 999 acres	50
1,000 acres and over	36
Total	1,062
Total in 1900	1,076

Land and Farm Areas.

Approximate land, acres	892,800
Land in farms in 1910	248,080
Land in farms in 1900	440,371
Improved land in farms in 1910	98,608
Improved land in farms in 1900	121,063
Woodland in farms	32,194
Other unimproved land	117,278

Value of all Farm Property.

Total value in 1910	$10,234,101
Total value in 1900	6,547,761
Per cent increase 1900-1910	56.3
Land in 1910	7,747,744
Land in 1900	4,839,730
Buildings in 1910	1,399,840
Buildings in 1900	998,620
Implements and machinery in 1910	320,083
Implements and machinery in 1900	222,060
Domestic animals, poultry and bees in 1910	766,434
Domestic animals, poultry and bees in 1900	487,351

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	2,421
Other cows	2,283
Yearling heifers	602
Calves	1,204
Yearling steers and bulls	428
Other steers and bulls	532
Total	7,510
Value	*$182,827
Horses—	
Mature horses	3,762
Yearling colts	294
Spring colts	137
Total	4,193
Value	$398,692
Mules—	
Mature mules	459
Yearling colts	13
Spring colts	26
Total	498
Value	$58,460
Asses and burros—	
Number	66
Value	$1,529
Swine—	
Mature hogs	1,822
Spring pigs	1,565
Total	3,387
Value	$23,785
Sheep—	
Rams, ewes and wethers	15,142
Spring lambs	9,326
Total	24,468
Value	$68,716
Goats—	
Number	1,542
Value	$3,455
Total value all domestic animals	$737,464
Poultry and bees—	
Poultry of all kinds	43,619
Value	$26,714
Colonies of bees	657
Value	$2,256

Principal Crops.

	Acres	Bushels
Corn	27	1,055
Oats	3,030	40,397
Wheat	5,721	62,167
Barley	1,318	17,128
Kafir corn and milo maize	8	161
Potatoes	72	7,442

Hay and forage—	Acres	Tons
Timothy alone	38	37
Timothy and clover mixed	20	27
Clover alone	78	77
Alfalfa	465	1,249
Other tame and cultivated grasses	218	206
Wild, salt or prairie grasses	1,202	824
Grains cut green	14,009	10,978
All other hay and forage	4	6
Totals	16,034	13,404

Poultry products—	
Poultry raised, number	62,151
Eggs produced, dozen	235,606
Value poultry and eggs produced	$110,974
Honey and wax—	
Honey produced, pounds	7,338
Wax produced, pounds	80
Value honey and wax produced	$814
Wool—	
Wool, fleeces shorn	28,841
Mohair and goat hair, fleeces shorn	177
Value wool and mohair produced	$21,728
Special crops—	
Potatoes, acres	72
All other vegetables, acres	408

Orchard fruits—	Number bearing trees
Apples	42,704
Apricots	4,092
Cherries	31,209
Peaches and nectarines	683,824
Pears	142,999
Prunes and plums	279,766
Total	1,190,074

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*Includes animals, age and sex not specified.

PLACER COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Tropical fruits—	Number bearing trees
Figs	4,463
Lemons	714
Oranges	26,921
Pomeloes	289
Olives	26,396
Total	59,906

Grapevines—	
Number in bearing	1,340,132

Small fruits—	
Strawberries, acres	433
Blackberries and dewberries, acres	62
All others, acres	87
Total	582

Nuts—	Number bearing trees
Almonds	11,539
Pecans	2
Walnuts	535
Total	12,122

Irrigation.

Number of farms irrigated in 1909	618
Acres irrigated in 1909	16,845
Acreage enterprises were capable of irrigating in 1910	23,365
Acreage included in projects	61,751
Main ditches, number	35
Length, miles	194
Laterals, number	46
Length, miles	108
Pumped wells, number	2
Cost of irrigation enterprises up to July 1, 1910	$2,798,740
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$119.78

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	2,000	$40,000
Clay, pottery, tons	49,126	37,536
Gold	------	414,319
Lead, pounds	711	33
Limestone, tons	1,236	2,432
Silver	------	24,543
Stone, miscellaneous	------	98,187
Other minerals*	------	346,810
Total		$963,860
Number mineral springs		12

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*Includes asbestos and copper.

PLUMAS COUNTY.

Date of creation, March 18, 1854.

Land area, 2,594 square miles.
County seat, Quincy (township).
Population per square mile, 2.0.

	1890	1900	1910
Population	4,933	4,657	5,259
Population	818	748	884

Elevation, 3,400 feet. 1916:	Highest	Lowest		Inches		Inches
Temperature	96	—8	Rainfall	49.25	Snow	187.0

Plumas County is situated in the northeastern part of California. It is bounded on the north by Shasta and Lassen counties, on the south by Yuba, Butte, and Sierra counties, on the east by Lassen, and on the west by Butte and Tehama counties. In the lowest portion the elevation is about 1,800 feet, but sloping gradually from its valleys, it rises gently to an elevation on its mountain ridges of over 7,000 feet. Although a great deal of valley lands have been cultivated, there is still a large acreage of uncleared land.

Plumas County has the largest area of timber land of any county in California. It is practically one entire sweep of forest land from one end to the other. While the greater part of it has been in reserve, the timber on it has been taken up, and the many sawmills throughout its mountains are turning out thousands of feet of white, sugar pine and spruce lumber.

Running in numerous channels through all of its mountain ridges, the ancient river beds afford large stores of gold. There have been millions of dollars in gold taken from the mines of Plumas. There has also been a great deal of surface mining done in times past. The mining section of Plumas is scattered throughout the entire county.

Hot Spring Valley, near the northwest corner of the county, contains scores of rumbling springs from which issue steam, or in which hot mud is bubbling, suggesting nearness to an active volcano. To the southwest of this valley are the geyser and a lake of boiling mud.

PLUMAS COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	6
10 to 19 acres	5
20 to 49 acres	9
50 to 99 acres	12
100 to 174 acres	45
175 to 259 acres	19
260 to 499 acres	37
500 to 999 acres	46
1,000 acres and over	42
Total	221
Total in 1900	267

Land and Farm Areas.

Approximate land, acres	1,660,160
Land in farms in 1910	134,259
Land in farms in 1900	184,449
Improved land in farms in 1910	54,281
Improved land in farms in 1900	57,351
Woodland in farms	27,238
Other unimproved land	52,740

Value of all Farm Property.

Total value in 1910	$3,362,955
Total value in 1900	2,239,876
Per cent increase 1900-1910	50.1
Land in 1910	2,201,654
Land in 1900	1,211,530
Buildings in 1910	532,156
Buildings in 1900	387,010
Implements and machinery in 1910	123,300
Implements and machinery in 1900	97,240
Domestic animals, poultry and bees in 1910	505,845
Domestic animals, poultry and bees in 1900	544,096

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,437
Other cows	1,954
Yearling heifers	1,561
Calves	1,586
Yearling steers and bulls	1,468
Other steers and bulls	1,395
Total	11,401
Value	$279,651

PLUMAS COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	1,770
Yearling colts	2
Spring colts	68
Total	2,044
Value	$200,409
Mules—	
Mature mules	41
Yearling colts	2
Total	43
Value	$4,435
Asses and burros—	
Number	5
Value	$1,560
Swine—	
Mature hogs	665
Spring pigs	744
Total	1,409
Value	$8,922
Sheep—	
Rams, ewes and wethers	845
Spring lambs	314
Total	1,159
Value	$4,080
Goats—	
Number	10
Value	$32
Total value all domestic animals	$499,089
Poultry and bees—	
Poultry of all kinds	9,649
Value	$6,272
Colonies of bees	121
Value	$484

Principal Crops.

	Acres	Bushels
Oats	2,193	75,606
Wheat	766	10,313
Barley	1,260	12,216
Potatoes	100	12,638

Hay and forage—	Acres	Tons
Timothy alone	851	1,084
Timothy and clover mixed	5,239	7,191
Clover alone	155	286
Alfalfa	711	1,104
Other tame and cultivated grasses	2,402	2,892
Wild, salt, or prairie grasses	19,794	20,425
Grains cut green	985	1,031
All other hay and forage	15	25
Totals	30,152	34,038

Poultry products—	
Poultry raised, number	15,163
Eggs produced, dozen	48,511
Value of poultry and eggs produced	$22,206

Honey and wax—	
Honey produced, pounds	2,280
Wax produced, pounds	5
Value of honey and wax produced	$308
Wool—	
Wool, fleeces shorn	593
Value of wool and mohair produced	$767
Special crops—	
Potatoes, acres	100
All other vegetables, acres	97

Orchard fruits—	Number bearing trees
Apples	3,534
Apricots	18
Cherries	65
Peaches and nectarines	184
Pears	261
Prunes and plums	510
Total	4,574

Tropical fruits—	Number bearing trees
Figs	6
Olives	6
Total	12

Small fruits—	
Strawberries, acres	6
Blackberries and dewberries, acres	1
All others, acres	6
Total	13

Nuts—	Number bearing trees
Walnuts	4

Irrigation.

Number of farms irrigated in 1909	151
Acres irrigated in 1909	36,602
Acreage enterprises were capable of irrigating in 1910	37,529
Acreage included in projects	37,901
Main ditches, number	147
Length, miles	201
Laterals, number	62
Length, miles	16
Flowing wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$107,118
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$2.85

Mineral Production in 1915.

Substance	Amount	Value
Copper, pounds	3,164,496	$553,787
Gold		167,440
Silver		19,025
Stone, miscellaneous		5,431
Other minerals		32
Total		$745,715
Number of mineral springs		16

RIVERSIDE COUNTY.

Date of creation, March 11, 1893.

		1890	1900	1910	1916 (estimated)
Land area, 7,240 square miles.	Population	-----	17,897	34,696	------
County seat, Riverside (city).	Population	4,683	7,973	15,212	19,763
Population per square mile, 4.8.					

	Highest	Lowest		Inches		Inches
Elevation, 851 feet. 1916: Temperature	105	25	Rainfall	16.60	Snow	T

Riverside County was formed in 1893 from the southwestern part of San Bernardino and the northern part of San Diego counties. It is about 200 miles long by 40 miles wide, and embraces most varied geographical and topographical features, climate, scenery, soil, agricultural, horticultural, and mineral resources. It contains within its borders one of the highest mountains in southern California and part of Salton Sea, 250 feet below sea level.

The principal rivers of the county are the Colorado, which forms its eastern boundary; the Santa Ana, having its head in the San Bernardino range of mountains, flowing through the northwestern part of the county, furnishing irrigation for a large area of land; the San Jacinto, having its source in the San Jacinto range, flowing through the San Jacinto, Hemet, and Perris valleys, and forming Lake Elsinore.

The central and greater part of the eastern portion of the county is desert, but known to be heavily mineralized. The high cost of freight, fuel, and scarcity of water, making prospecting dangerous, all combine to retard mining developments.

The San Jacinto and Hemet valleys, situated about 45 miles southeast of Riverside City, at the base of the San Jacinto Mountains, are excellently adapted to diversified farming, and the foothills to stock grazing. The San Jacinto Valley is watered by numerous flowing wells and the Hemet Valley by the great Hemet dam, the largest piece of solid masonry in the West, forming a reservoir filled with pure mountain water.

The progress of the county has been practically confined to its northwest corner, which embraces one of the largest orange-growing districts in the state. It is supplied by one of the best and most complete irrigating systems in the state. The entire western portion is being brought under cultivation from the rapid development of artesian wells. There is also a large acreage in lemons. A factory has been established at Riverside for the manufacture of orange juice, which has proved entirely successful. The capacity of the plant is 4,000 pounds of culls per day, producing approximately 2,000 pint bottles of orange syrup.

During the last fifteen years dates have been grown in an experimental way, but the industry is now well established. In the Coachella Valley and the country around Palo Verde they are being extensively cultivated, but the expense is greater than for other orchard crops, owing to the cost of the offshoots. There are about 5,000 palms shortly coming into bearing. There were perhaps 3,500 trees bearing in 1916 in a commercial way, not counting the young trees with only a few pounds. There were about 30,000 pounds of dates harvested for the 1916 crop, according to the estimates furnished, which is but approximately correct. The 1916 crop compared with the previous year was much larger, perhaps twice as much, as there are many trees coming into bearing each year. As to the 1917 crop, it will be much heavier than last year, due to the fact that there are so many young seedling trees that will bear this year; then, too, the imported trees are commencing to bear, which will increase the yield quite materially. The coming crop is estimated at about 75,000 pounds. From a small ten-acre garden that commenced to bear last year, perhaps one hundred trees averaged 20 pounds to the tree, which were about five years old. The fruit sold readily packed in confectionery boxes at 75 cents a pound for the fancy and 50 cents a pound for the second grade, and was sold by the leading grocery stores in Los Angeles, which paid 40 cents a pound wholesale for the second grade. This was from a seedling garden, not from imported trees.

HORTICULTURAL STATISTICS OF RIVERSIDE COUNTY, 1916.

(*Information supplied by the County Horticultural Commission.*)

Districts Where the Various Fruits Are Mostly Grown.

	Acres		Acres
Oranges—		Olives —	
Riverside District, including Arlington, Highgrove and West Riverside	13,353	Banning	10
Corona	4,418	Beaumont	65
Hemet	1,030	Elsinore	862
Perris	700	Perris	255
Lemons—		Hemet	400
Riverside District	2,608	Corona	160
Corona	2,492	Peaches—	
Avocado—		Banning	523
Riverside District	27	Beaumont	121
Almonds—		Corona	285
Banning	1,212	Perris	135
Elsinore	129	Hemet	1,275
Apples—		San Jacinto	152
Beaumont	1,947	Pears—	
Banning	381	Beaumont	253
Yucaipa District	485	Perris	170
Hemet	870	Hemet	150
Apricots—		San Jacinto	38
Banning	958	Elsinore	49
Beaumont	56	Prunes—	
Corona	280	Banning	493
Elsinore	619	Walnuts—	
Hemet	4,380	Elsinore	349
San Jacinto	631	Perris	40
Cherries—		Hemet	1,000
Beaumont	400	San Jacinto	96
Grapes—		Dates—	
Wineville District	2,000	Coachella Valley	200
Coachella Valley	336		

Principal Crops.

	Acres		Acres
Grain (barley and wheat)	122,701	Alfalfa	31,168
Dry edible beans	2,789	Sugar beets	3,220
Potatoes	425	Cotton	4,812

The Palo Verde Valley, along the Colorado River, in the eastern end of Riverside County, produced 4,675 bales of cotton last season, with indications of a largely increased acreage in the future.

The date industry is becoming firmly established in the Coachella Valley, and is unique in that this is the only section in the United States where date growing on a commercial scale has proven successful.

In the Arlington district, which is the Petaluma of southern California, the latest figures show about 50,000 laying hens, producing about 6,000,000 eggs per year. They sell for an average of 28 cents a dozen, which would make $140,000 for the eggs alone. A careful canvass of all the other towns in Riverside County would find as many more as there are in Riverside proper, so that for the whole county the above figures should be doubled.

The olive crop amounts to about 725 tons.

In 1915 there were nearly 50,000 colonies of bees in the county. The extracted honey amounted to 405 tons and the comb honey 66 tons, or a total of 471 tons. The average price of the former was 5 cents per pound, and of the latter 12 cents a pound. The total amount was 962,000 pounds and the value $57,340. Of this 60 tons, or 120,000 pounds, was "orange honey."

RIVERSIDE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	42
3 to 9 acres	462
10 to 19 acres	596
20 to 49 acres	614
50 to 99 acres	262
100 to 174 acres	262
175 to 259 acres	99
260 to 499 acres	166
500 to 999 acres	104
1,000 acres and over	81
Total	2,688
Total in 1900	2,340

Land and Farm Areas.

Approximate land, acres	4,633,600
Land in farms in 1910	520,806
Land in farms in 1900	427,097
Improved land in farms in 1910	278,151
Improved land in farms in 1900	216,033
Woodland in farms	30,231
Other unimproved land	212,424

Value of all Farm Property.

Total value in 1910	$46,203,795
Total value in 1900	21,644,031
Per cent increase 1900-1910	113.5
Land in 1910	39,363,652
Land in 1900	18,488,110
Buildings in 1910	3,666,689
Buildings in 1900	1,999,850
Implements and machinery in 1910	1,112,189
Implements and machinery in 1900	399,280
Domestic animals, poultry, and bees in 1910	2,061,265
Domestic animals, poultry, and bees in 1900	756,791

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	5,235
Other cows	4,449
Yearling heifers	2,493
Calves	2,203
Yearling steers and bulls	1,333
Other steers and bulls	3,755
Total	19,468
Value	$484,082
Horses—	
Mature horses	8,969
Yearling colts	943
Spring colts	403
Total	10,315
Value	$1,157,357
Mules—	
Mature mules	1,303
Yearling colts	83
Spring colts	43
Total	1,429
Value	$205,099
Asses and burros—	
Number	88
Value	$9,050
Swine—	
Mature hogs	3,892
Spring pigs	2,258
Total	6,150
Value	$44,770

RIVERSIDE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes, and wethers	5,589
Spring lambs	1,420
Total	7,009
Value	$30,167
Goats—	
Number	924
Value	$6,712
Total value all domestic animals	$1,937,237
Poultry and bees—	
Poultry of all kinds	84,226
Value	$61,742
Colonies of bees	18,900
Value	$62,286

Principal Crops.

	Acres	Bushels
Corn	372	12,421
Oats	3,767	85,540
Wheat	11,817	159,434
Barley	56,946	958,526
Kafir corn and milo maize	44	580
Dry edible beans	50	192
Potatoes	309	22,392

Hay and forage—	Acres	Tons
Timothy alone	5	5
Alfalfa	12,904	69,230
Other tame and cultivated grasses	795	2,000
Wild, salt, or prairie grasses	14	15
Grains cut green	73,985	69,235
All other hay and forage	727	1,309
Totals	88,430	141,794

Poultry products—	
Poultry raised, number	95,767
Eggs produced, dozen	438,099
Value poultry and eggs produced	$183,490
Honey and wax—	
Honey produced, pounds	902,106
Wax produced, pounds	12,915
Value honey and wax produced	$62,337
Wool—	
Wool, fleeces shorn	4,536
Mohair and goat hair, fleeces shorn	13
Value wool and mohair produced	$2,600
Special crops—	
Potatoes, acres	309
Sweet potatoes, acres	57
All other vegetables, acres	1,225
Sugar beets, acres	4

Orchard fruits—	Number bearing trees
Apples	10,577
Apricots	83,069
Cherries	982
Peaches and nectarines	72,933
Pears	18,447
Prunes and plums	34,857
Total	220,723

Tropical fruits—	Number bearing trees
Figs	2,054
Lemons	115,020
Oranges	1,021,957
Pomeloes	4,477
Olives	80,572
Total	1,224,217

Grapevines—	
Number in bearing	1,570,749
Small fruits—	
Strawberries, acres	27
Blackberries and dewberries, acres	28
All others, acres	9
Total	64

Nuts—	Number bearing trees
Almonds	21,789
Pecans	98
Walnuts	3,040
Total	24,940

Irrigation.

Number of farms irrigated in 1909	2,174
Acres irrigated in 1909	71,436
Acreage enterprises were capable of irrigating in 1910	103,233
Acreage included in projects	210,452
Main ditches, number	301
Length, miles	500
Laterals, number	262
Length, miles	288
Flowing wells, number	553
Pumped wells, number	792
Cost of irrigation enterprises up to July 1, 1910	$5,648,469
Average cost per acre irrigation enterprises were capable of irrigating in 1910	54.72

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	1,055	$16,880
Clay, pottery, tons	59,564	54,840
Copper, pounds	23,825	4,169
Gold	------	10,769
Gypsum, tons	3,450	13,650
Lead, pounds	32,072	1,507
Mineral water, gallons	200,000	10,000
Silver	------	1,522
Stone, miscellaneous	------	213,440
Other minerals*	------	1,022,814
Total	------	$1,349,591
Number of mineral springs		23

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*Includes cement, potash and silica.

SACRAMENTO COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1916 (estimated)
Land area, 983 square miles.	Population	40,339	45,915	67,806	------
County seat, Sacramento (city).	Population	26,386	29,282	44,696	66,895
Population per square mile, 69.0.					

	Highest	Lowest		Inches		Inches
Elevation, 71 feet. 1916: Temperature	105	30	Rainfall	18.27	Snow	3.5

Sacramento County is one of the largest in the Sacramento Valley, as well as one of the oldest in the state, having been organized by the first legislature. Its principal cities and towns are: Sacramento, Folsom, Galt, Elk Grove, Fair Oaks, Courtland, Walnut Grove, Isleton, Franklin, and Cosumnes.

Its area is almost all rich, alluvial plain, ranging from 30 to 125 feet above sea level, rising gradually from the rivers to meet the low, rolling foothills of the Sierra Nevada Mountains.

The Sacramento River is the longest and largest in the state, and is navigable from Red Bluff to San Francisco Bay, giving unexcelled transportation facilities, landing freight on deep water vessels at a minimum cost.

The American River rises in the upper Sierra and enters the county at the northeast corner among the low foothills, flowing in a southwesterly direction, and emptying into the Sacramento just north of the city of Sacramento.

The fish in the rivers are salmon, striped bass, sturgeon, pike, perch, catfish, shad, carp, and black bass.

Strawberries are marketed here eleven months in the year, and fresh vegetables are obtainable the year round. The largest asparagus beds in the state are within the confines of Sacramento County. Alfalfa grows luxuriantly without irrigation on the rich bottom lands.

The river districts are most prolific producers of beans. Egyption corn, potatoes, asparagus, in fact, all kinds of vegetables thrive, many of them having two growing seasons.

Along the Sacramento, American, and Cosumnes rivers are some of the most productive hop fields in the United States. Hop culture on this coast dates back to 1858. It was early demonstrated that the soil and climate of Sacramento County are unsurpassed for hop culture. For thirty years Sacramento was the largest hop-growing county in the state.

Sacramento County presents splendid opportunities to the live-stock breeder and the dairyman. There are a number of large creameries in the county and the largest and most modern dairy on the coast is located here. The climate is so temperate and mild that animals remain in the open air practically unsheltered the year round without hardship. The soil, because of its fertility, is peculiarly adapted to the growth of forage crops, especially alfalfa, which is at the same time one of the cheapest of stock feeds.

Hogs are raised generally by the farmers, and pedigreed Poland China, Berkshire, and Duroc Jersey swine are bred quite extensively and have proven very profitable.

Poultry raising has steadily increased in importance in the last few years. Elk Grove, Galt, Folsom, Rio Linda, and Perkins are among the principal poultry-raising districts.

There are a number of wineries in the county.

One of the largest rock-crushing plants is located in the county, supplying many thousands of tons of crushed rock for the many uses made of it.

THE WEALTH OF SACRAMENTO COUNTY.

The wealth of Sacramento County is increasing amazingly, as is indicated by the following statement taken from the records of the County Assessor. In 1910 the total assessed valuation of property in the county was $58,620,075. The total assessed valuation of property was in excess of $96,500,000 in 1916. This wonderful gain in values is due to the tremendous industrial development in all lines of endeavor and it is not unwise to estimate that the gain in material wealth will be in far greater proportion by the close of the European war, when much of the commerce of the world will be directed through the Panama Canal, thereby adding greatly to the population and development of all California and the Pacific Coast States.

While it must be apparent to the reader that there has been marked activity in the industrial life of Sacramento County and consequent rise in property values, it should be thoroughly understood that there has been no boom here and all values are based upon actual worth. Land in Sacramento County is valued on a basis of what it will produce.

Sacramento County is just a trifle smaller than the state of Rhode Island, its total area being 988 square miles. There is very little waste land in the county, now that practically all the overflowed areas have been reclaimed. Most of the land is level; it rises gently eastward from the Sacramento River to the foothills of the Sierra Nevada Mountains on the eastern border of the county.

The population is estimated at 90,000. It will probably pass the 100,000 mark long before the next federal census is taken. That there is plenty of room for expansion is shown by figures on the density of population taken from the last official census. The rural population per square mile in 1910 was only 23.5.

The county has an excellent system of good roads. Two main trunk lines of the state highway pass through the county and state roads lead from Sacramento City in five different directions. The Lincoln Highway, the transcontinental road from New York to San Francisco, passes through Sacramento. One hundred twenty miles of new road are under construction at the present time.

The level condition of the county's surface renders motoring ideal. Most of the farmers of the county own motor cars, which they use for business and pleasure.

STATISTICS OF PRODUCTION.

The following are the number of carloads of principal crops in Sacramento County:

Deciduous fruits	3,300
Citrus fruits	325
Beans	2,500
Potatoes	500
Fresh vegetables	500
Strawberries	200
Grapes	700
	8,025

The production of the following principal crops in Sacramento County ranks as follows:

First	Asparagus
First	Pears
Third	Beans
Fourth	Grapes
Fourth	Plums
Fifth	Almonds
Sixth	Olives
Sixth	Cherries

STATISTICS OF PRODUCTION—Continued.

Principal Deciduous Fruits.	Number of trees
Pears	501,000
Peaches	310,000
Prunes and plums	330,000
Cherries	64,000
Apricots	50,000
Apples	50,000
Tropical Fruits.	
Olives	109,900
Oranges	102,000
Lemons	3,000
Pomeloes	4,500
Figs	1,200
Nuts.	
Almonds	180,000
Walnuts	2,720
Total	1,708,320

Grapevines. (Principal varieties.)	Acres
Tokay, Muscat, Ladyfinger, Cornishon, Mission	17,000

Berries.	Acres
Strawberries	900
Cane berries	175
Total	1,075

Summary.	
Total number of trees	1,708,320
Total number of acres of grapevines	17,000
Total number of acres of berries	1,075

Principal Forage Crops.	Acres	Tons
Wheat and barley	15,194	10,370
Oats	5,000	2,500
Corn, kafir and milo	1,295.	1,615
Dry edible beans	25,000	37,500
Hops	2,948	3,000
Hay.		
Alfalfa	42,000	168,000
Meadow grass	5,623	6,696
Timothy and clover	1,525	1,609
Grain hay	94,000	70,500
Sudan grass	100	200
Vegetables.		
Asparagus	12,500	50,000
Tomatoes	1,300	130,000
Celery	686	3,456
Dry onions	900	180
Vegetables, all kinds	1,850	--------
Vegetables, seed	2,500	1,200
Totals	211,421	486,826

SACRAMENTO COUNTY SUMMARY.

Number of Farms Classified by Size.	
Under 3 acres	12
3 to 9 acres	167
10 to 19 acres	237
20 to 49 acres	321
50 to 99 acres	170
100 to 174 acres	223
175 to 259 acres	96
260 to 499 acres	173
500 to 999 acres	111
1,000 acres and over	91
Total	1,601
Total in 1900	1,392

Land and Farm Areas.	
Approximate land, acres	629,120
Land in farms in 1910	473,044
Land in farms in 1900*	668,426
Improved land in farms in 1910	275,682
Improved land in farms in 1900	327,159
Woodland in farms	20,964
Other unimproved land	176,398

Value of all Farm Property.	
Total value in 1910	$36,694,682
Total value in 1900	19,326,626
Per cent increase 1900-1910	89.9
Land in 1910	30,425,404
Land in 1900	15,189,870
Buildings in 1910	3,205,416
Buildings in 1900	2,159,630
Implements and machinery in 1910	786,383
Implements and machinery in 1900	528,780
Domestic animals, poultry and bees in 1910	2,277,479
Domestic animals, poultry and bees in 1900	1,448,346

Domestic Animals on Farms and Ranges.	
Cattle*—	
Dairy cows	11,979
Other cows	5,484
Yearling heifers	3,195
Calves	5,568
Yearling steers and bulls	1,529
Other steers and bulls	1,961
Total	31,188
Value	†$838,431
Horses—	
Mature horses	8,770
Yearling colts	773
Spring colts	426
Total	9,969
Value	$1,022,335
Mules—	
Mature mules	703
Yearling colts	30
Spring colts	10
Total	743
Value	$87,020
Asses and burros—	
Number	19
Value	$6,245
Swine—	
Mature hogs	6,421
Spring pigs	4,034
Total	10,455
Value	$73,278

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*By an error the acreage in 1900 was reported to be 668,426, instead of 501,448.
†Includes animals, age and sex not specified.

SACRAMENTO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes and wethers	25,828
Spring lambs	21,129
Total	46,957
Value	$160,221
Goats—	
Number	89
Value	$280
Total value all domestic animals	$2,187,810
Poultry and bees—	
Poultry of all kinds	116,556
Value	$84,188
Colonies of bees	1,835
Value	$5,481

Principal Crops.

	Acres	Bushels
Corn	795	34,089
Oats	4,174	66,949
Wheat	10,704	103,728
Barley	4,599	75,575
Kafir corn and milo maize	2	43
Dry edible beans	7,801	166,852
Potatoes	1,406	160,519

Hay and forage—	Acres	Tons
Timothy alone	1,303	1,187
Clover alone	222	422
Alfalfa	9,602	32,021
Other tame and cultivated grasses	3,714	3,570
Wild, salt, or prairie grasses	1,909	2,196
Grains cut green	40,130	31,040
All other hay and forage	56	112
Totals	56,936	70,548

Poultry products—	
Poultry raised, number	144,704
Eggs produced, dozen	666,906
Value of poultry and eggs produced	$249,821
Honey and wax—	
Honey produced, pounds	55,272
Wax produced, pounds	160
Value of honey and wax produced	$5,393
Wool—	
Wool, fleeces shorn	41,103
Mohair and goat hair, fleeces shorn	7
Value wool and mohair produced	$35,449
Special crops—	
Potatoes, acres	1,406
All other vegetables, acres	6,367
Sugar beets, acres	7

Orchard fruits—	Number bearing trees
Apples	10,948
Apricots	10,480
Cherries	17,173
Peaches and nectarines	99,635
Pears	161,094
Prunes and plums	206,553
Total	506,961

Tropical fruits—	Number bearing trees
Figs	1,145
Lemons	2,500
Oranges	46,256
Pomeloes	864
Olives	34,077
Total	84,863

Grapevines—	
Number in bearing	7,627,510
Small fruits—	
Strawberries, acres	450
Blackberries and dewberries, acres	52
All others, acres	52
Total	554

Nuts—	Number bearing trees
Almonds	66,372
Pecans	3
Walnuts	755
Total	67,156

Irrigation.

Number of farms irrigated in 1909	1,053
Acres irrigated in 1909	53,683
Acreage enterprises were capable of irrigating in 1910	69,970
Acreage included in projects	74,588
Main ditches, number	213
Length, miles	238
Laterals, number	5
Length, miles	8
Pumped wells, number	1,168
Cost of irrigation enterprises up to July 1, 1910	$1,452,471
Average cost per acre irrigation enterprises were capable of irrigating in 1910	20.76

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	9,920	$82,973
Gold		2,131,813
Platinum, ounces	196	6,217
Silver		3,151
Stone, miscellaneous		284,127
Other minerals		54,000
Total		$2,562,281

SAN BENITO COUNTY.

Date of creation, February 12, 1874.

		1890	1900	1910	1915 (estimated)
Land area, 1,392 square miles.	Population	6,412	6,633	8,041	------
County seat, Hollister (town).	Population	1,234	1,315	2,308	2,500
Population per square mile, 5.8.					

	Highest	Lowest		Inches		Inches
Elevation, 284 feet. 1916: Temperature	100	25	Rainfall	19.91	Snow	T

The county extends from northwest to southeast about 60 miles, with a general breadth of 20 miles. The Gabilan Mountains on the southwest constitute the dividing line from Monterey County, and at their base flows northerly, the entire length, the San Benito River. Farther east the Tres Pinos forms another valley.

Irrigation is by gravity from the San Benito River and the Tres Pinos. This is supplemented by an extensive system of pumping from an apparently inexhaustible supply of underground flow, and further by artesian wells in the northern end of the county.

The lime industry, though once large, has ceased, awaiting better transportation facilities. The quicksilver product of the New Idria mines goes on unceasingly. Large deposits of potter's clay of superior quality lie in easy access.

SAN BENITO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	87
10 to 19 acres	83
20 to 49 acres	118
50 to 99 acres	93
100 to 174 acres	107
175 to 259 acres	56
260 to 499 acres	144
500 to 999 acres	109
1,000 acres and over	117
Total	921
Total in 1900	907

Land and Farm Areas.

Approximate land, acres	890,880
Land in farms in 1910	544,301
Land in farms in 1900	512,719
Improved land in farms in 1910	186,573
Improved land in farms in 1900	168,698
Woodland in farms	52,466
Other unimproved land	305,262

Value of all Farm Property.

Total value in 1910	$14,963,867
Total value in 1900	9,117,058
Per cent increase 1900-1910	64.1
Land in 1910	11,272,156
Land in 1900	7,057,190
Buildings in 1910	1,336,855
Buildings in 1900	852,340
Implements and machinery in 1910	391,058
Implements and machinery in 1900	272,030
Domestic animals, poultry and bees in 1910	1,963,798
Domestic animals, poultry and bees in 1900	935,498

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	4,828
Other cows	11,064
Yearling heifers	4,459
Calves	5,864
Yearling steers and bulls	4,151
Other steers and bulls	8,987
Total	39,703
Value	*$939,660
Horses—	
Mature horses	6,921
Yearling colts	955
Spring colts	599
Total	8,475
Value	$843,985
Mules—	
Mature mules	74
Yearling colts	19
Spring colts	3
Total	96
Value	$11,145
Asses and burros—	
Number	29
Value	$945
Swine—	
Mature hogs	5,572
Spring pigs	2,560
Total	8,132
Value	$57,253

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*Includes animals, age and sex not specified.

SAN BENITO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes and wethers	10,635
Spring lambs	4,511
Total	15,146
Value	$55,239
Goats—	
Number	489
Value	$1,159
Total value all domestic animals	$1,909,386
Poultry and bees—	
Poultry of all kinds	95,289
Value	$50,414
Colonies of bees	1,177
Value	$3,998

Principal Crops.

	Acres	Bushels
Corn	401	5,389
Oats	776	13,826
Wheat	4,451	57,535
Barley	10,955	307,215
Dry edible beans	59	677
Potatoes	205	25,438
Totals	16,847	410,080

Hay and forage—	Acres	Tons
Alfalfa	1,940	7,700
Other tame and cultivated grasses	440	630
Wild, salt, or prairie grasses	3,727	3,827
Grains cut green	57,319	70,439
All other hay and forage	638	1,784
Totals	64,064	84,380

Poultry products—	
Poultry raised, number	79,550
Eggs produced, dozen	696,264
Value poultry and eggs produced	$225,891
Honey and wax—	
Honey produced, pounds	68,253
Wax produced, pounds	773
Value honey and wax produced	$5,671
Wool—	
Wool, fleeces shorn	19,457
Mohair and goat hair, fleeces shorn	33
Value wool and mohair produced	$18,974
Special crops—	
Potatoes, acres	205
All other vegetables, acres	183
Sugar beets, acres	283

Orchard fruits—	Number bearing trees
Apples	26,593
Apricots	694
Cherries	3,421
Peaches and nectarines	12,301
Pears	12,409
Prunes and plums	91,066
Total	207,537

Tropical fruits—	Number bearing trees
Figs	128
Lemons	5
Oranges	42
Olives	4
Total	179

Grapevines—	
Number in bearing	177,976
Small fruits—	
Strawberries, acres	35
Blackberries and dewberries, acres	1
All others, acres	18
Total	54

Nuts—	Number bearing trees
Almonds	6,958
Pecans	6
Walnuts	1,369
Total	8,333

Irrigation.

Number of farms irrigated in 1909	240
Acres irrigated in 1909	7,186
Acreage enterprises were capable of irrigating in 1910	13,790
Acreage included in projects	20,067
Main ditches, number	64
Length, miles	61
Laterals, number	12
Length, miles	33
Pumped wells, number	87
Cost of irrigation enterprises up to July 1, 1910	$177,924
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$12.90

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	260	$1,560
Dolomite, tons	2,500	9,500
Mineral water, gallons	1,200	300
Quicksilver, flasks	6,291	475,370
Stone, miscellaneous		155,000
Other minerals		335
Total		$642,065
Number of mineral springs		1

SAN BERNARDINO COUNTY.

Date of creation, April 26, 1853.

		1890	1900	1910	1916 (estimated)
Land area, 20,157 square miles.	Population	25,497	27,929	56,706	------
County seat, San Bernardino (city).	Population	4,012	6,159	12,779	16,945

Population per square mile, 2.8.

		Highest	Lowest		Inches		Inches
Elevation, 1,054 feet.	1916: Temperature	105	23	Rainfall	25.62	Snow	T

San Bernardino is not only the largest county in California, but it is the largest in the United States. It is larger than New Hampshire, Vermont, and Rhode Island combined; larger than New Jersey, Delaware, Massachusetts, and Rhode Island combined; very nearly as large as Massachusetts, Connecticut, and New Jersey. There are eight states whose area is less than that of this county.

San Bernardino County is in the southeastern part of the state. The greater portion is desert. In the north is the Mojave desert, and in the east the northern end of the Colorado desert, the arable portion being confined to the southwestern part—the San Bernardino Valley. This valley forms an almost perfect amphitheater, encircled by mountains and hills, open only on the west, allowing the sea breeze from the ocean to sweep its entire length.

Mount San Bernardino, from its distinctive cone, has been adopted by the United States surveyors as the initial point for land surveys in southern California, both base and meridian starting from its peak.

The northern and western portions of the county are almost sterile, yet, along the Majave River, where it debouches from the mountains to the desert, and for many miles, the land on both sides is fertile, easily worked, and produces abundantly as long as the water supply is available.

Here was dug the first irrigation ditch in the state, and here were raised the first crops by irrigation. It is over a hundred years since the mission fathers of San Gabriel established a sub-mission, just west of Redlands, and employed Indian labor to dig what is known as the zanja. This ancient ditch is still in use and within the same banks that were first thrown up by Indian labor almost a century ago.

Almost every variety of fruit can be produced in some part of this county. On the lower levels, all the deciduous fruits are produced. The production of oranges, lemons, and pomeloes is large, these fruits being grown to perfection. The production of oranges has increased rapidly during the last few years. There has also been a large increase within the last five years, in alfalfa, and deciduous fruits, but wine grapes are grown to a considerable extent; one of the largest vineyards in the state at Guasti, belonging to the Italian Vineyard Company, contains 3,200 acres of all the best varieties of wine grapes.

In the western part of Rialto, Etiwanda and Cucamonga neighborhoods a considerable quantity of raisins are made.

In the southwest corner of the valley is located the Chino Ranch, on which is one of the largest beet-sugar factories.

There are but few, if any, sheep in the county, the Census Bureau in 1910 reporting only seven, and the assessor's reports 1910–1915 states that there are none, but in 1916 reports 260.

Vegetables of nearly all descriptions are raised. The northern and eastern portions are heavily mineralized. The most promising source of potash is in the saline deposits at Searles Lake, where a development plant has been erected, effecting a complete commercial utilization of the vast supply of raw material in sight. The deposits are not only rich in potash but contain, also, borax, common salt, sodium sulphate, and sodium carbonate. The scarcity of water, which renders the life of the prospector precarious, as well as interfering with the working of the mines, and the scarcity and high cost of fuel, all combined, have limited prospecting and retarded mining development, but in spite of these drawbacks the county ranks sixteenth in the state in mineral production, the total value being $1,614,000 in 1914.

SAN BERNARDINO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	76
3 to 9 acres	567
10 to 19 acres	918
20 to 49 acres	703
50 to 99 acres	278
100 to 174 acres	209
175 to 259 acres	70
260 to 499 acres	75
500 to 999 acres	35
1,000 acres and over	18
Total	2,949
Total in 1900	2,350

Land and Farm Areas.

Approximate land, acres	12,900,480
Land in farms in 1910	208,396
Land in farms in 1900	219,132
Improved land in farms in 1910	136,625
Improved land in farms in 1900	96,920
Woodland in farms	23,137
Other unimproved land	48,634

Value of all Farm Property.

Total value in 1910	$68,499,103
Total value in 1900	24,656,402
Per cent increase 1900-1910	177.8
Land in 1910	60,681,348
Land in 1900	21,000,370
Buildings in 1910	5,238,858
Buildings in 1900	2,573,120
Implements and machinery in 1910	1,077,851
Implements and machinery in 1900	395,860
Domestic animals, poultry, and bees in 1910	1,501,046
Domestic animals, poultry and bees in 1900	687,052

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,043
Other cows	4,389
Yearling heifers	1,075
Calves	926
Yearling steers and bulls	481
Other steers and bulls	2,847
Total	12,761
Value	$335,713

Horses—	
Mature horses	6,339
Yearling colts	372
Spring colts	167
Total	6,878
Value	$899,831

Mules—	
Mature mules	757
Yearling colts	18
Spring colts	3
Total	778
Value	$139,476

Asses and burros—	
Number	88
Value	$1,789

Swine—	
Mature hogs	2,562
Spring pigs	1,187
Total	3,749
Value	$29,173

Sheep—	
Rams, ewes and wethers	7
Value	$35

Goats—	
Number	81
Value	$506
Total value all domestic animals	$1,406,523

Poultry and bees—	
Poultry of all kinds	91,098
Value	$65,160
Colonies of bees	8,073
Value	$29,363

Principal Crops.

	Acres	Bushels
Corn	920	14,839
Oats	436	16,598
Wheat	100	200
Barley	3,260	85,480
Kafir corn and milo maize	1,216	15,391
Potatoes	444	43,364

SAN BERNARDINO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Hay and forage—	Acres	Tons
Timothy alone	10	15
Clover alone	18	40
Alfalfa	8,263	35,922
Other tame and cultivated grasses	89	146
Wild, salt, or prairie grasses	55	44
Grains cut green	33,764	39,414
All other hay and forage	409	778
Totals	42,608	76,359

Poultry products—	
Poultry raised, number	105,606
Eggs produced, dozen	579,685
Value poultry and eggs produced	$228,998

Honey and wax—	
Honey produced, pounds	363,025
Wax produced, pounds	5,983
Value honey and wax produced	$23,466

Special crops—	
Potatoes, acres	444
Sweet potatoes, acres	55
All other vegetables, acres	813
Sugar beets, acres	4,121

Orchard fruits—	Number bearing trees
Apples	55,150
Apricots	111,125
Cherries	3,057
Peaches and nectarines	197,763
Pears	2,302
Prunes and plums	8,779
Total	379,533

Tropical fruits—	Number bearing trees
Figs	1,144
Lemons	157,731
Oranges	1,951,254
Pomeloes	13,134
Olives	30,190
Total	2,153,501

Grapevines—	
Number in bearing	5,987,127

Small fruits—	
Strawberries, acres	34
Blackberries and dewberries, acres	68
All others, acres	28
Total, acres	130

Nuts—	Number bearing trees
Almonds	634
Walnuts	2,228
Total	2,862

Irrigation.

Number of farms irrigated in 1909	2,463
Acres irrigated in 1909	70,278
Acreage enterprises were capable of irrigating in 1910	86,107
Acreage included in projects	152,415
Main ditches, number	291
Length, miles	466
Laterals, number	237
Length, miles	283
Flowing wells, number	79
Pumped wells, number	449
Cost of irrigation enterprises up to July 1, 1910	$9,416,960
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$109.36

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	400	$2,400
Cement, barrels	915,000	980,000
Copper, pounds	209,440	36,652
Gold	------	416,967
Lead, pounds	169,183	7,952
Limestone, tons	68,500	68,500
Mineral water, gallons	37,480	7,350
Salt, tons	542	3,324
Silver	------	64,165
Stone, miscellaneous	------	178,528
Tungsten concentrates, tons	864	840,947
Zinc, pounds	39,848	4,941
Other minerals*	------	62,316
Total	------	$2,674,042
Number of mineral springs		44

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*Includes dolomite, gypsum, lime, manganese, marble, mineral paint, soapstone and talc.

SAN DIEGO COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1916 (estimated)
Land area, 4,221 square miles.*	Population	34,897	35,090	61,665	------
County seat, San Diego (city).	Population	16,159	17,700	39,578	53,330
Population per square mile, 14.6.					

	Highest	Lowest		Inches		Inches
Elevation, 87 feet. 1916: Temperature	84	36	Rainfall	11.56	Snow	0

San Diego occupies the extreme southwestern portion of the state, and has an area slightly larger than Massachusetts. The Pacific Ocean washes its shores for upward of 75 miles. The land rises gently from the ocean for a distance of about 50 miles to a chain of peaks forming the backbone of the county, descending again quite rapidly to the Colorado River, the greater part of which is below sea level.

The arable portion of the western slope is divided into a series of irregular terraces or plateaus. The lower, or coast, terrace comprises a number of valleys with the intervening mesa. This large acreage is practically frostless. Next comes a series of higher valleys, varying in elevation from 400 to 500 feet. The third terrace, the altitude of which ranges from 1,000 to 2,500 feet, comprises the foothill region, with numerous smaller intervening valleys, nooks, and glens. Next comes the mountain region. The elevation of the mountain valleys varies from 2,500 to 4,500 feet. They are chiefly devoted to stock raising.

The arable soil of the county may be classed under two heads: granitic and adobe; though there is often a mixture of both, resembling adobe.

San Diego County is coming to the front in the production of Lima beans, some of the most productive sections yielding from 40 to 45 sacks per acre.

The intermountain region, the hills and valleys between the plains of Imperial and the western slope of the county, is rich in minerals, and affords excellent pasturage for several thousand cattle.

The orange, lemon, pomelo, or grapefruit, do well. Raisin grapes are also produced in one or two districts. Olives are grown on a considerable scale in the county. San Diego City has two olive oil factories. Within the last five years apples have increased considerably, peaches and pears have more than doubled, and there has been a large increase in lemons. A limited acreage has recently been planted in avocado trees.

Peaches, apricots, pears, quinces, plums, cherries, and other deciduous fruits do well.

The mineral wealth of San Diego County, though known to be great, is largely undeveloped.

San Diego is producing the finest tourmaline in the United States.

The climate of San Diego is all that could be desired.

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*About half of the eastern part of the county, comprising 4,089 square miles, was organized into Imperial County in 1907.

SAN DIEGO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	20
3 to 9 acres	236
10 to 19 acres	345
20 to 49 acres	414
50 to 99 acres	269
100 to 174 acres	337
175 to 259 acres	146
260 to 499 acres	246
500 to 999 acres	156
1,000 acres and over	129
Total	2,298
Total in 1900	2,698

Land and Farm Areas.

Approximate land, acres	2,701,440
Land in farms in 1910	834,426
Land in farms in 1900	809,419
Improved land in farms in 1910	234,045
Improved land in farms in 1900	229,791
Woodland in farms	71,020
Other unimproved land	529,361

Value of all Farm Property.

Total value in 1910	$31,124,814
Total value in 1900	18,346,677
Per cent increase 1900-1910	*
Land in 1910	23,934,732
Land in 1900	14,133,990
Buildings in 1910	3,337,382
Buildings in 1900	2,170,190
Implements and machinery in 1910	851,591
Implements and machinery in 1900	533,980
Domestic animals, poultry and bees in 1910	3,001,109
Domestic animals, poultry and bees in 1900	1,508,517

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	10,633
Other cows	15,815
Yearling heifers	7,874
Calves	8,088
Yearling steers and bulls	6,490
Other steers and bulls	9,877
Total	58,777
Value	$1,356,802
Horses—	
Mature horses	9,663
Yearling colts	1,130
Spring colts	705
Total	11,498
Value	$1,262,938
Mules—	
Mature mules	683
Yearling colts	60
Spring colts	23
Total	766
Value	$95,570
Asses and burros—	
Number	181
Value	$11,036
Swine—	
Mature hogs	4,261
Spring pigs	3,130
Total	7,391
Value	$59,842
Sheep—	
Rams, ewes and wethers	220
Spring lambs	69
Total	289
Value	$1,310
Goats—	
Number	1,147
Value	$2,789
Total value all domestic animals	$2,790,287
Poultry and bees—	
Poultry of all kinds	130,158
Value	$104,829
Colonies of bees	30,566
Value	$105,993

Principal Crops.

	Acres	Bushels
Corn	4,544	71,874
Oats	7,690	177,485
Wheat	7,268	82,012
Barley	17,745	284,677
Kafir corn and milo maize	17	282
Dry edible beans	3,492	45,661
Potatoes	374	35,717

Hay and forage—	Acres	Tons
Timothy alone	26	58
Clover alone	1	5
Alfalfa	2,566	11,739
Other tame and cultivated grasses	6,655	6,225
Wild, salt, or prairie grasses	2,792	2,018
Grains cut green	68,844	60,362
All other hay and forage	1,165	6,152
Totals	82,049	86,559

Poultry products—	
Poultry raised, number	174,778
Eggs produced, dozen	921,117
Value poultry and eggs produced	$357,579
Honey and wax—	
Honey produced, pounds	1,559,607
Wax produced, pounds	18,589
Value of honey and wax produced	$89,401
Wool—	
Wool, fleeces shorn	155
Mohair and goat hair, fleeces shorn	60
Value wool and mohair produced	$195
Special crops—	
Potatoes, acres	374
Sweet potatoes, acres	27
All other vegetables, acres	1,131
Sugar beets, acres	21

SAN DIEGO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	37,662
Apricots	20,858
Cherries	1,792
Peaches and nectarines	29,800
Pears	6,023
Prunes and plums	16,022
Total	112,993

Tropical fruits—	Number bearing trees
Figs	2,459
Lemons	195,318
Oranges	107,457
Pomeloes	5,764
Olives	109,871
Total	425,260

Grapevines—	
Number in bearing	1,228,858
Small fruits—	
Strawberries, acres	43
Blackberries and dewberries, acres	22
All others, acres	22
Total	87

Nuts—	Number bearing trees
Almonds	9,279
Pecans	1,080
Walnuts	9,159
Total	19,651

Irrigation.

Number of farms irrigated in 1909	890
Acres irrigated in 1909	24,944
Acreage enterprises were capable of irrigating in 1910	31,205
Acreage included in projects	45,535
Main ditches, number	288
Length, miles	259
Laterals, number	244
Length, miles	140
Pumped wells, number	438
Cost of irrigation enterprises up to July 1, 1910	$3,753,127
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$120.27

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	1,260	$21,025
Copper, pounds	3,008	526
Gems	------	2,465
Gold	------	1,364
Lead, pounds	23	1
Mineral water, gallons	10,350	1,035
Salt, tons	17,616	19,616
Silver	------	9
Stone, miscellaneous	------	163,723
Other minerals	------	1,365
Total		$211,129
Number of mineral springs		19

SAN FRANCISCO COUNTY.

Date of creation, February 18, 1850.

	1890	1900	1910	1916 (estimated)
Population	298,997	342,782	416,912	463,516

Land area, 43 square miles.
County seat, San Francisco.
Population per square mile, 9,695.6.

Elevation, 207 feet.

1916:	Highest	Lowest		Inches		Inches
Temperature	87	37	Rainfall	28.09	Snow	T

San Francisco is essentially a commercial and manufacturing city. It produces no agricultural products, except to a small extent the minor vegetables. Its location on the bay of San Francisco, one of the finest and safest harbors in the world, eminently fits it for a commercial city, and its importance in this respect insures it a place among the chief shipping centers of the world.

The value of all property has increased enormously in recent years in spite of a temporary setback owing to the terrible double disaster of earthquake and fire in 1906, as the following summary of assessed values will prove:

1850	$21,621,184	1911	$545,398,908
1860	35,967,499	1912	605,141,664
1870	116,375,988	1913	624,182,130
1880	253,520,326	1914	647,456,025
1890	301,438,040	1915	656,677,332
1900	410,425,849	1916	

The total county indebtedness in 1916 amounted to $43,616,600. Space will not allow of even a brief summary of the vast resources and possibilities of this great, rising, and progressive city, but much up-to-date information of value will be found in numerous publications, especially in the annual reports of the San Francisco Chamber of Commerce.*

SAN FRANCISCO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	69
3 to 9 acres	50
10 to 19 acres	11
20 to 49 acres	15
50 to 99 acres	7
100 to 174 acres	4
175 to 259 acres	1
Total	157
Total in 1900	304

Land and Farm Areas.

Approximate land, acres	27,520
Land in farms in 1910	2,091
Land in farms in 1900	8,219
Improved land in farms in 1910	1,562
Improved land in farms in 1900	3,829
Woodland in farms	289
Other unimproved land	240

Value of all Farm Property.

Total value in 1910	$2,630,428
Total value in 1900	2,407,893
Per cent increase 1900-1910	9.2
Land in 1910	2,097,111
Land in 1900	1,855,030
Buildings in 1910	326,789
Buildings in 1900	228,100
Implements and machinery in 1910	68,270
Implements and machinery in 1900	71,200
Domestic animals, poultry, and bees in 1910	138,258
Domestic animals, poultry, and bees in 1900	253,563

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	1,645
Other cows	10
Yearling heifers	581
Calves	174
Yearling steers and bulls	75
Other steers and bulls	25
Total	2,510
Value	$77,015

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*For the foreign trade of the port of San Francisco see Part XII.

SAN FRANCISCO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	318
Spring colts	1
Total	319
Value	$32,480
Swine—	
Mature hogs	181
Spring pigs	100
Total	281
Value	$1,655
Sheep—	
Rams, ewes, and wethers	3
Value	$20
Goats—	
Number	9
Value	$60
Total value all domestic animals	$111,230
Poultry and bees—	
Poultry of all kinds	42,649
Value	$26,889
Colonies of bees	6
Value	$14

Principal Crops.

	Acres	Bushels
Potatoes	87	7,366
Hay and forage—	Acres	Tons
Alfalfa	1	10
Other tame and cultivated grasses	60	60
Grains cut green	42	80
Totals	103	150

Poultry products—	
Poultry raised, number	196,020
Eggs produced, dozen	110,057
Value poultry and eggs produced	$126,595

Wool—	
Wool, fleeces shorn	3
Value wool and mohair produced	$4
Special crops—	
Potatoes, acres	87
Sweet potatoes, acres	2
All other vegetables, acres	466

	Number bearing trees
Orchard fruits—	
Apples	40
Peaches and nectarines	120
Prunes and plums	945
Total	1,105

Olives—	
Number in bearing	1
Grapevines—	
Number in bearing	3,000

Irrigation.

Number of farms irrigated in 1909	25
Acres irrigated in 1909	383
Acreage enterprises were capable of irrigating in 1910	383
Acreage included in projects	383
Main ditches, number	24
Length, miles	7
Pumped wells, number	39
Cost of irrigation enterprises up to July 1, 1910	$21,975
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$57.38

Mineral Production in 1915.

	Value
Miscellaneous stone	$128,270

Imports and Exports at San Francisco for the Year Ending December 31, 1916.

Gold.

	Value
Imports—	
Ore and base bullion	$3,180,470
Bullion, refined	3,409,791
Foreign coin	31,632,914
Total	$38,223,175
Domestic exports—	
U. S. Mint or assay office bars	15,277,884
Bullion, refined	701,315
Coin	29,758,599
Total	$45,737,798
Foreign exports—	
Coin	$216,422

Silver.

	Ounces	Value
Exports—		
Refined silver bullion	18,326,966	$12,080,244
U. S. coin	--------	7,803
Foreign coin	--------	180,090
Foreign refined bullion	59,968	46,045
Shipments to Hawaii, U. S. coin	--------	377,920

	Value
Imports—	
In ore and base bullion	$3,381,524
U. S. coin	3,200
Foreign coin	328,891

Total Collections.

(From all sources.)

San Francisco	$4,733,206
Oakland	4,377
Eureka	580
Imports—	
District of San Francisco	117,128,253
Exports—	
Domestic	123,832,543
Foreign merchandise	3,965,988
Shipments to Hawaii	32,279,182
Shipments to Alaska	2,884,246
Shipments to American Samoa	208,340
Shipments to Guam	203,216

SAN JOAQUIN COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1916 (estimated)
Land area, 1,448 square miles.	Population	28,629	35,452	50,731	------
County seat, Stockton (city).	Population	14,424	17,506	23,253	35,358
Population per square mile, 35.0.					

	Highest	Lowest		Inches		Inches
Elevation, 23 feet. 1916: Temperature	102	25	Rainfall	18.85	Snow	3.0

San Joaquin County lies directly east of San Francisco and San Pablo bays and spans the great interior valley of California from the foothills of the Coast Range to the foothills of the Sierra Nevada Mountains. It thus commands the entrance to the chief port and metropolis of the coast from the continent, and for both water and land traffic; hence it is termed the "Gateway County." It embraces most of the famous San Joaquin Delta within its limits. The soil varies in character, but the surface is mostly level and well adapted to intensive agriculture. The climate of this area is tempered by sea influences, by the air which rushes through the gap in the Coast Range.

The county is famous for its good roads, on which $30,000,000 has been expended.

(*Information supplied by the Chamber of Commerce.*)

Four hundred miles of navigable waterways, three transcontinental railways, three interurban lines, and three hundred and fifty miles of improved highways give San Joaquin County unusually good transportation facilities and make it possible to capitalize fully its advantageous location, directly east of San Francisco. A developed arm of the San Joaquin River penetrates into the center of its county seat, Stockton. The county is in the heart of the great central valley of California and extends to the rolling land that fronts the Sierra Nevada Mountains. The western third of the county embraces the far-famed San Joaquin Delta, reclaimed by levee construction and drainage, land of exceptional productivity. The soils of the county are roughly divided into peats of the delta, the adobes along the river and surrounding Stockton, the deep, mellow loams of the west side, and the great body of sandy loam found in the northern and southern parts of the county. It is estimated that over 40 per cent of the farm area of the county is developed for irrigation by public and private enterprises.

Second in California and twelfth in the United States in the value of all crops, according to census figures, San Joaquin County produces annually about 13½ per cent on its assessed valuation, this ratio being higher than for any other county in the state. The per capita wealth of its rural districts, $2,448.74, is greater than that of any other California county. San Joaquin County is first in the production of cereals, vegetables, potatoes, barley, and table grapes; second in hay and forage, oats and rye; third in grapes; fourth in wheat, beans, peas, and bearing almond trees. It is significant to note that all the crops noted are staples. Animal husbandry is fast coming to the front, opportunities in such lines being especially attractive. Sugar beets have become one of the important crops, and sugar factories are under construction near Manteca and Tracy, and another is projected near Stockton.

From the foregoing it is evident that San Joaquin County has made a record for the diversity as well as for the volume of its crops.

SAN JOAQUIN COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	9
3 to 9 acres	204
10 to 19 acres	531
20 to 49 acres	797
50 to 99 acres	397
100 to 174 acres	395
175 to 259 acres	217
260 to 499 acres	371
500 to 999 acres	221
1,000 acres and over	144
Total	3,286
Total in 1900	1,966

Land and Farm Areas.

Approximate land, acres	926,720
Land in farms in 1910	763,048
Land in farms in 1900	751,065
Improved land in farms in 1910	611,762
Improved land in farms in 1900	652,923
Woodland in farms	35,387
Other unimproved land	115,899

Value of all Farm Property.

Total value in 1910	$67,286,628
Total value in 1900	31,218,424
Per cent increase 1900-1910	115.5
Land in 1910	55,909,884
Land in 1900	25,769,500
Buildings in 1910	5,675,665
Buildings in 1900	2,297,130
Implements and machinery in 1910	1,741,053
Implements and machinery in 1900	907,410
Domestic animals, poultry and bees in 1910	3,960,026
Domestic animals, poultry and bees in 1900	2,244,294

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	11,904
Other cows	6,861
Yearling heifers	3,636
Calves	4,960
Yearling steers and bulls	1,937
Other steers and bulls	1,998
Total	31,296
Value	$874,834
Horses*—	
Mature horses	18,256
Yearling colts	1,597
Spring colts	1,089
Total	20,972
Value	*$2,247,876
Mules—	
Mature mules	3,169
Yearling colts	217
Spring colts	144
Total	3,530
Value	$482,560
Asses and burros—	
Number	62
Value	$16,760
Swine—	
Mature hogs	13,473
Spring pigs	9,981
Total	23,454
Value	$143,626
Sheep—	
Rams, ewes and wethers	14,807
Spring lambs	10,012
Total	24,819
Value	$83,771
Goats—	
Number	260
Value	$728
Total value all domestic animals	$3,850,155
Poultry and bees—	
Poultry of all kinds	175,456
Value	$101,710
Colonies of bees	3,014
Value	$8,161

Principal Crops.

	Acres	Bushels
Corn	2,547	57,028
Oats	23,208	396,661
Wheat	24,786	310,587
Barley	125,114	3,827,187
Kafir corn and milo maize	2,968	32,786
Dry edible beans	13,954	352,157
Potatoes	21,313	4,279,395

Hay and forage—	Acres	Tons
Timothy and clover mixed	190	320
Clover alone	70	352
Alfalfa	8,805	36,859
Other tame and cultivated grasses	3,633	3,975
Wild, salt, or prairie grasses	10,248	12,286
Grains cut green	80,851	119,032
All other hay and forage	1,119	1,624
Totals	104,916	174,448

Poultry products—	
Poultry raised, number	212,434
Eggs produced, dozen	955,501
Value poultry and eggs produced	$337,417
Honey and wax—	
Honey produced, pounds	104,645
Wax produced, pounds	3,459
Value of honey and wax produced	$6,565
Wool—	
Wool, fleeces shorn	20,477
Mohair and goat hair, fleeces shorn	37
Value of wool and mohair produced	$14,114
Special crops—	
Potatoes, acres	21,313
Sweet potatoes, acres	19
All other vegetables, acres	6,728
Sugar beets, acres	132

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*Includes animals, age and sex not specified.

SAN JOAQUIN COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	5,053
Apricots	53,007
Cherries	21,590
Peaches and nectarines	185,073
Pears	13,664
Prunes and plums	83,641
Total	364,290

Tropical fruits—	Number bearing trees
Figs	4,037
Lemons	75
Oranges	1,950
Pomeloes	2
Olives	19,998
Total	26,070

Grapevines—	
Number in bearing	13,371,794

Small fruits—	
Strawberries, acres	33
Blackberries and dewberries, acres	31
All others, acres	28
Total	92

Nuts—	Number bearing trees
Almonds	97,024
Pecans	6
Walnuts	2,455
Total	99,499

Irrigation.

Number of farms irrigated in 1909	1,452
Acres irrigated in 1909	59,811
Acreage enterprises were capable of irrigating in 1910	77,083
Acreage included in projects	173,563
Main ditches, number	298
Length, miles	308
Laterals, number	49
Length, miles	192
Pumped wells, number	1,618
Cost of irrigation enterprises up to July 1, 1910	$1,689,720
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$21.92

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	3,000	$75,000
Manganese, tons	460	7,400
Natural gas, M cubic feet	161,923	143,974
Stone, miscellaneous	-------	21,620
Other minerals	-------	400
Total		$248,394

SAN LUIS OBISPO COUNTY.

Date of creation, February 12, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 3,334 square miles.	Population	16,072	16,637	19,383	------
County seat, San Luis Obispo (city).	Population	2,995	3,021	5,157	6,500

Population per square mile, 5.8.

	Highest	Lowest		Inches		Inches
Elevation, 201 feet. 1916: Temperature	96	29	Rainfall	36.40	Snow	T

This large and fertile county lies on the coast side of the state, about midway between San Francisco and Los Angeles. It is an old county, organized in the days of gold, and received its name nearly a hundred years before the Americans came into the country. It was a great region in the days of the Spanish occupation, and is a great region still in its advantages of soil and climate, of diversified surface and abundant natural resources.

Much grain is still grown. In the eastern portion of the county wheat is still a large product, with an increasing acreage sown to barley.

Fruit is grown successfully in almost all portions of the county, and there are wide areas where fruit of many kinds is a prolific crop. The coast section is especially adapted, nearly every variety doing well.

Paso Robles is the leading town east of the Santa Lucia Mountains, and the second in size in the county, and is pleasantly situated on the Salinas River in a land of oaks and rolling hills. Its chief features are the hot springs. The great hot springs flow approximately 2,000,000 gallons per day, and there are several other springs of varying chemical constituents and adapted to wide medicinal uses.

The producing oil wells of San Luis Obispo County demonstrate the fact that the Monterey shale, found over the greater portion of the coast side of the county, is an extension of those of the great Santa Maria oil fields immediately adjoining the county on the south. Port San Luis, which is the terminus of three pipe lines from the Santa Maria fields, is one of the largest oil ports. The well-known Coalinga, Kern River, Midway, Sunset, and McKittrick fields are also connected by pipe line with this port.

SAN LUIS OBISPO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	65
10 to 19 acres	80
20 to 49 acres	179
50 to 99 acres	187
100 to 174 acres	267
175 to 259 acres	123
260 to 499 acres	304
500 to 999 acres	288
1,000 acres and over	214
Total	1,714
Total in 1900	1,813

Land and Farm Areas.

Approximate land, acres	2,133,760
Land in farms in 1910	1,588,660
Land in farms in 1900	1,034,480
Improved land in farms in 1910	326,928
Improved land in farms in 1900	412,356
Woodland in farms	174,891
Other unimproved land	1,086,841

Value of all Farm Property.

Total value in 1910	$32,426,353
Total value in 1900	14,635,757
Per cent increase 1900-1910	121.6
Land in 1910	24,745,375
Land in 1900	11,133,180
Buildings in 1910	2,136,447
Buildings in 1900	1,272,820
Implements and machinery in 1910	742,498
Implements and machinery in 1900	479,840
Domestic animals, poultry, and bees in 1910	4,802,033
Domestic animals, poultry, and bees in 1900	1,749,917

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	24,193
Other cows	22,903
Yearling heifers	10,345
Calves	15,635
Yearling steers and bulls	8,948
Other steers and bulls	33,180
Total	118,704
Value	*$2,789,415

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*Includes animals, age and sex not specified.

SAN LUIS OBISPO COUNTY SUMMARY—Conainued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	12,601
Yearling colts	1,686
Spring colts	987
Total	15,274
Value	$1,451,086
Mules—	
Mature mules	754
Yearling colts	83
Spring colts	40
Total	877
Value	$108,795
Asses and burros—	
Number	19
Value	$2,095
Swine—	
Mature hogs	11,750
Spring pigs	6,118
Total	17,868
Value	$110,380
Sheep—	
Rams, ewes, and wethers	54,717
Spring lambs	32,236
Total	86,953
Value	$256,156
Goats—	
Number	7,390
Value	$14,783
Total value all domestic animals	$4,733,160
Poultry and bees—	
Poultry of all kinds	119,822
Value	$53,605
Colonies of bees	3,936
Value	$15,268

Principal Crops.

	Acres	Bushels
Corn	1,509	24,015
Oats	1,139	35,884
Wheat	33,608	428,636
Barley	26,370	667,718
Kafir corn and milo maize	1	24
Dry edible beans	11,169	207,674
Potatoes	955	105,277
Hay and forage—	Acres	Tons
Alfalfa	989	2,658
Other tame and cultivated grasses	1,888	2,103
Wild, salt, or prairie grasses	830	1,038
Grains cut green	50,954	62,650
All other hay and forage	339	1,776
Total	55,000	70,225

Poultry products—	
Poultry raised, number	109,871
Eggs produced, dozens	840,405
Value of poultry and eggs produced	$243,244
Honey and wax—	
Honey produced, pounds	177,342
Wax produced, pounds	1,983
Value of honey and wax produced	$11,374

Wool—	
Wool, fleeces shorn	64,719
Mohair and goat hair, fleeces shorn	4,758
Value of wool and mohair produced	$52,868
Special crops—	
Potatoes, acres	955
Sweet potatoes, acres	3
All other vegetables, acres	950
Sugar beets, acres	284
Orchard fruits—	Number bearing trees
Apples	35,006
Apricots	20,123
Cherries	702
Peaches and nectarines	10,614
Pears	5,097
Prunes and plums	21,383
Total	93,217
Tropical fruits—	Number bearing trees
Figs	819
Lemons	955
Oranges	794
Pomeloes	75
Olives	1,597
Total	4,253
Grapevines—	
Number in bearing	265,481
Small fruits—	
Strawberries, acres	45
Blackberries and dewberries, acres	30
All others, acres	62
Total	137
Nuts—	Number bearing trees
Almonds	9,281
Pecans	1
Walnuts	7,871
Total	17,261

Irrigation.

Number of farms irrigated in 1909	91
Acres irrigated in 1909	1,687
Acreage enterprises were capable of irrigating in 1910	2,416
Acreage included in projects	2,539
Main ditches, number	51
Length, miles	42
Laterals, number	5
Length, miles	3
Flowing wells, number	4
Pumped wells, number	12
Cost of irrigation enterprises up to July 1, 1910	$32,311
Average cost per acre irrigation enterprises were capable of irrigating in 1910	13.37

Mineral Production in 1915.

Substance	Amount	Value
Mineral water, gallons	4,500	$675
Quicksilver, flasks	1,473	125,542
Stone, miscellaneous	-----	99,475
Other minerals*	-----	1,940
Total	-----	$227,632
Number of mineral springs		12

*Includes bituminous rock and chrome.

SAN MATEO COUNTY.

Date of creation, April 19, 1856.

		1890	1900	1910	1915 (estimated)
Land area, 447 square miles.	Population	10,087	12,094	26,585	------
County seat, Redwood (city).	Population	1,572	1,653	2,442	3,500

Population per square mile, 59.5.

San Mateo (Station):
Elevation, 22 feet. (No observation station in county).

San Mateo County is that part of the San Francisco peninsula lying between San Francisco County on the north and Santa Clara and Santa Cruz counties on the south. This county is divided lengthwise by the Santa Morena ridge of mountains, forming the backbone of the peninsula. The mountain ridge is the fertile and picturesque watershed of a region peculiarly adapted for homes of beauty and comfort on its eastern slope. Along the bay shore are many miles of deep water, and spur tracks to this deep water are now under construction, thereby opening up vast possibilities to manufacturers who desire cheap sites with excellent shipping facilities.

On the west the descent to the Pacific is quick and abrupt into a region occupied by farmers, dairymen, stock raisers, and lumbermen. The whole ridge is anywhere accessible, and all more or less covered with oak and redwood.

Climatic and scenic surroundings, shipping facilities, proximity to the metropolis of the Pacific Coast, are all favorable conditions working toward the prosperity of this county.

(*Information supplied by the Chamber of Commerce.*)

San Mateo County is the home of the artichoke and brussels sprouts, the rolling hill country of its western shore showing thousands of acres under cultivation for these vegetables, the market for which extends from the Pacific to the Atlantic. All sorts of vegetables thrive in San Mateo County, the northern end seemingly being particularly adapted for their cultivation. The cultivation of flowers, both in the open and under glass, finds in the climatic conditions found in San Mateo County an aid which has resulted in the development of a large and profitable industry. Seventy-five per cent of the flowers sold in San Francisco's world-famed street marts are produced in San Mateo County. The violet beds of San Mateo, some of which are acres in extent, have long been a lure for tourists.

On the east shore or bay side of San Mateo County deep water has brought the county an extensive industrial development, particularly at South San Francisco and Redwood City, where harbors and manufacturing centers have been developed, some of the largest plants on the coast being located at these points.

The wondrous scenic attractions of the county have been capitalized by the people through the expenditure of nearly one and one-half million dollars in the construction of a magnificent highway system radiating from El Camino Real, the state highway, which passes through the county and joins the paved streets of San Francisco at the county line. The construction of these roads has brought an unprecedented growth to the county, evidenced by the beautiful homes built and now under course of construction in what were formerly inaccessible spots.

Climatic and scenic surroundings, road, rail and shipping facilities, proximity to the metropolis of the Pacific Coast, are all favorable conditions working toward the prosperity of the county.

SAN MATEO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	46
3 to 9 acres	81
10 to 19 acres	55
20 to 49 acres	112
50 to 99 acres	61
100 to 174 acres	90
175 to 259 acres	52
260 to 499 acres	67
500 to 999 acres	60
1,000 acres and over	41
Total	665
Total in 1900	551

Land and Farm Areas.

Approximate land, acres	286,080
Land in farms in 1910	160,655
Land in farms in 1900	149,944
Improved land in farms in 1910	100,800
Improved land in farms in 1900	72,429
Woodland in farms	27,334
Other unimproved land	32,521

Value of all Farm Property.

Total value in 1910	$20,870,585
Total value in 1900	10,354,856
Per cent increase 1900-1910	101.6
Land in 1910	17,448,280
Land in 1900	8,201,140
Buildings in 1910	2,006,705
Buildings in 1900	1,333,390
Implements and machinery in 1910	398,327
Implements and machinery in 1900	173,600
Domestic animals, poultry and bees in 1910	1,017,273
Domestic animals, poultry and bees in 1900	646,726

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	8,119
Other cows	2,305
Yearling heifers	1,848
Calves	2,375
Yearling steers and bulls	369
Other steers and bulls	272
Total	15,288
Value	$463,646
Horses—	
Mature horses	3,940
Yearling colts	253
Spring colts	102
Total	4,295
Value	$425,976
Mules—	
Mature mules	10
Yearling colts	2
Total	12
Value	$915
Asses and burros—	
Number	2
Value	$50
Swine—	
Mature hogs	8,692
Spring pigs	3,990
Total	12,682
Value	$93,912
Sheep—	
Rams, ewes and wethers	767
Spring lambs	562
Total	1,329
Value	$5,140
Goats—	
Number	154
Value	$569
Total value all domestic animals	$990,208
Poultry and bees—	
Poultry of all kinds	47,625
Value	$26,112
Colonies of bees	289
Value	$953

Principal Crops.

	Acres	Bushels
Corn	11	164
Oats	16,125	162,566
Wheat	68	1,473
Barley	917	26,001
Dry edible beans	466	14,435
Potatoes	971	109,879

Hay and forage—	Acres	Tons
Timothy and clover mixed	6	6
Clover alone	18	36
Alfalfa	11	52
Other tame and cultivated grasses	2,472	3,638
Wild, salt, or prairie grasses	82	57
Grains cut green	16,466	25,181
All other hay and forage	5	12
Totals	19,060	28,982

Poultry products—	
Poultry raised, number	43,946
Eggs produced, dozen	236,642
Value poultry and eggs produced	$82,139
Honey and wax—	
Honey produced, pounds	5,458
Wax produced, pounds	193
Value of honey and wax produced	$810
Wool—	
Wool, fleeces shorn	1,013
Mohair and goat hair, fleeces shorn	26
Value wool and mohair produced	$1,162
Special crops—	
Potatoes, acres	971
All other vegetables, acres	3,210

SAN MATEO COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	18,634
Apricots	3,694
Cherries	671
Peaches and nectarines	572
Pears	1,688
Prunes and plums	18,279
Total	43,655

Tropical fruits—	Number bearing trees
Figs	36
Lemons	1
Oranges	25
Olives	7,187
Total	7,249

Grapevines—	
Number in bearing	124,990

Small fruits—	
Strawberries, acres	56
Blackberries and dewberries, acres	10
All others, acres	3
Total	69

Nuts—	Number bearing trees
Almonds	94
Walnuts	223
Total	331

Irrigation.

Number of farms irrigated in 1909	75
Acres irrigated in 1909	3,648
Acreage enterprises were capable of irrigating in 1910	3,653
Acreage included in projects	3,983
Main ditches, number	57
Length, miles	58
Pumped wells, number	40
Cost of irrigation enterprises up to July 1, 1910	$90,921
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$24.89

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	715	$19,550
Gems	------	100
Salt, tons	25,500	63,750
Stone, miscellaneous	------	93,391
Other minerals	------	1,100
Total	------	$177,891

SANTA BARBARA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1916 (estimated)
Land area, 2,740 square miles.	Population	15,754	18,934	27,738	------
County seat, Santa Barbara (city).	Population	5,864	6,587	11,659	14,846

Population per square mile, 10.1.

	Highest	Lowest		Inches		Inches
Elevation, 130 feet. 1916: Temperature	91	32	Rainfall	32.19	Snow	T

Santa Barbara County is situated in the parallelogram formed by the trend in the California coast line made by Point Concepcion, the great continental headland. Its coast line is thus of considerable extent, being, in fact, about 100 miles in length. A chain of mountains, the Santa Ynez range, divides the county into two grand divisions. The southern division is the most populous. The surrounding country is agricultural, being devoted to the culture of walnuts, olives, lemons, and beans in large quantities.

The northern part contains four large valleys. Lompoc Valley is a very prosperous and fertile agricultural section. Much of the mustard seed used in the United States is grown in this district. Sweet pea seed is also grown here. Santa Ynez Valley is largely devoted to the raising of grain, as is the Los Alamos Valley. The Santa Maria Valley is the largest in southern California. Here is located the Union Sugar Company's factory at Betteravia. The hills on the southern side of this valley are the center of the large Santa Maria oil fields.

Santa Barbara has the best harbor in the county. There are large areas yet uncultivated and the county is ripe for immigration. Around Santa Maria the principal crops are sugar beets and beans of the pink and small white varieties. A large number of lemons are produced in the county, and it is also one of the principal walnut producing counties in the state, the annual shipments amounting to about 1,250 tons, which usually are of a very fine quality.

SANTA BARBARA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	17
3 to 9 acres	130
10 to 19 acres	140
20 to 49 acres	212
50 to 99 acres	164
100 to 174 acres	185
175 to 259 acres	105
260 to 499 acres	138
500 to 999 acres	93
1,000 acres and over	171
Total	1,355
Total in 1900	1,149

Land and Farm Areas.

Approximate land, acres	1,753,600
Land in farms in 1910	1,120,475
Land in farms in 1900	922,611
Improved land in farms in 1910	215,552
Improved land in farms in 1900	202,982
Woodland in farms	276,071
Other unimproved land	628,852

Value of all Farm Property.

Total value in 1910	$43,544,076
Total value in 1900	18,271,863
Per cent increase 1900-1910	138.3
Land in 1910	35,556,593
Land in 1900	14,849,440
Buildings in 1910	3,004,679
Buildings in 1900	1,375,290
Implements and machinery in 1910	804,264
Implements and machinery in 1900	365,770
Domestic animals, poultry and bees in 1910	4,178,540
Domestic animals, poultry and bees in 1900	1,681,363

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	11,690
Other cows	23,752
Yearling heifers	6,891
Calves	11,524
Yearling steers and bulls	8,666
Other steers and bulls	24,578
Total	87,576
Value	$2,223,007

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*Includes animals, age and sex not specified.

SANTA BARBARA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Horses—	
Mature horses	10,621
Yearling colts	1,442
Spring colts	971
Total	13,034
Value	$1,398,385
Mules—	
Mature mules	362
Yearling colts	56
Spring colts	25
Total	443
Value	$53,740
Asses and burros—	
Number	24
Value	$4,380
Swine—	
Mature hogs	$15,113
Spring pigs	6,960
Total	22,073
Value	$162,635
Sheep—	
Rams, ewes and wethers	60,205
Spring lambs	20,328
Total	80,533
Value	$275,259
Goats—	
Number	558
Value	$1,698
Total value all domestic animals	$4,119,104
Poultry and bees—	
Poultry of all kinds	89,995
Value	$46,815
Colonies of bees	4,072
Value	$12,621

Principal Crops.

	Acres	Bushels
Corn	1,240	25,979
Oats	9,494	233,171
Wheat	2,300	27,892
Barley	26,294	683,605
Dry edible beans	22,355	367,385
Potatoes	1,524	151,532
Hay and forage—	Acres	Tons
Timothy and clover mixed	100	150
Clover alone	25	100
Alfalfa	635	2,205
Other tame and cultivated grasses	223	267
Wild, salt, or prairie grasses	479	519
Grains cut green	47,602	64,690
All other hay and forage	1,006	2,215
Total	50,070	70,146

Poultry products—	
Poultry raised, number	91,159
Eggs produced, dozen	407,168
Value poultry and eggs produced	$151,719
Honey and wax—	
Honey produced, pounds	288,875
Wax produced, pounds	4,060
Value of honey and wax produced	$16,678
Wool—	
Wool, fleeces shorn	27,787
Mohair and goat hair, fleeces shorn	68
Value wool and mohair produced	$26,308

Special crops—	
Potatoes, acres	1,524
Sweet potatoes, acres	28
All other vegetables, acres	1,588
Sugar beets, acres	11,320
Orchard fruits—	Number bearing trees
Apples	2,744
Apricots	15,512
Cherries	659
Peaches and nectarines	9,560
Pears	2,612
Prunes and plums	2,730
Total	34,200
Tropical fruits—	Number bearing trees
Figs	858
Lemons	4,246
Oranges	46,181
Pomeloes	716
Olives	44,258
Total	99,023
Grapevines—	
Number in bearing	208,595
Small fruits—	
Strawberries, acres	24
Blackberries and dewberries, acres	32
All others, acres	7
Total, acres	63
Nuts—	Number bearing trees
Almonds	239
Pecans	70
Walnuts	96,776
Total	97,091

Irrigation.

Number of farms irrigated in 1909	137
Acres irrigated in 1909	12,012
Acreage enterprises were capable of irrigating in 1910	13,572
Acreage included in projects	13,603
Main ditches, number	76
Length, miles	75
Laterals, number	4
Length, miles	5
Flowing wells, number	7
Pumped wells, number	113
Cost of irrigation enterprises up to July 1, 1910	$370,186
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$27.28

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	1,800	$14,400
Limestone, tons	5,956	10,006
Mineral water, gallons	189,026	156,175
Natural gas, M cubic feet	3,193,368	279,697
Petroleum, barrels	5,634,534	3,442,700
Sandstone, cubic feet	29,900	6,488
Stone, miscellaneous		13,900
Other minerals*		61,600
Total		$3,984,966
Number of mineral springs		7

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*Includes infusorial earth and quicksilver.

SANTA CLARA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1916 (estimated)
Land area, 1,328 square miles.	Population	48,005	60,216	83,539	------
County seat, San Jose (city).	Population	18,060	21,500	28,946	38,902

Population per square mile, 62.9.

	Highest	Lowest		Inches		Inches
Elevation, 95 feet. 1916: Temperature	98	27	Rainfall	36.40	Snow	T

Santa Clara County is situated to the south of San Francisco Bay, and is separated from the Pacific Ocean by San Mateo and Santa Cruz counties. The county seat is San Jose, and is distant 50 miles from San Francisco. The county is 47 miles wide from north to south, and through the center runs the favored Santa Clara Valley, with an average width of 15 miles, which is one of the most fertile valleys in the state. The county from the valley slopes upward through rolling hills to the summit of the Santa Cruz Mountains on the west. The county is famous for its large fruit production, especially of prunes.

The roads are excellent, and make all points easily accessible. More than 300 miles of these roads are sprinkled during the summer months.

Educational interests are represented by the Leland Stanford Junior University, University of Santa Clara, the State Normal School, the College of the Pacific, and the College of Notre Dame.

The valley is drained by a number of streams. In summer their watercourses greatly diminish and smaller ones wholly disappear; having their sources in the surrounding hills and sinking as they approach the valley, they augment the subterranean supply of the artesian wells.

SANTA CLARA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	68
3 to 9 acres	773
10 to 19 acres	1,186
20 to 49 acres	1,317
50 to 99 acres	562
100 to 174 acres	376
175 to 259 acres	141
260 to 499 acres	147
500 to 999 acres	75
1,000 acres and over	86
Total	4,731
Total in 1900	3,995

Land and Farm Areas.

Approximate land, acres	849,920
Land in farms in 1910	734,819
Land in farms in 1900	710,686
Improved land in farms in 1910	237,170
Improved land in farms in 1900	290,285
Woodland in farms	153,835
Other unimproved land	343,814

Value of all Farm Property.

Total value in 1910	$67,187,549
Total value in 1900	50,724,703
Per cent increase 1900-1910	32.5
Land in 1910	52,882,603
Land in 1900	42,270,340
Buildings in 1910	9,125,640
Buildings in 1900	5,332,710
Implements and machinery in 1910	1,942,339
Implements and machinery in 1900	1,287,560
Domestic animals, poultry, and bees in 1910	3,236,967
Domestic animals, poultry, and bees in 1900	1,834,093

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	12,181
Other cows	12,251
Yearling heifers	4,449
Calves	5,443
Yearling steers and bulls	3,133
Other steers and bulls	7,552
Total	46,030
Value	*$1,218,607
Horses—	
Mature horses	14,405
Yearling colts	899
Spring colts	512
Total	15,816
Value	$1,763,731

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*Includes animals, age and sex not specified.

SANTA CLARA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	267
Yearling colts	7
Total	274
Value	$29,026
Asses and burros—	
Number	11
Value	$150
Swine—	
Mature hogs	4,165
Spring pigs	3,184
Total	7,349
Value	$61,121
Sheep—	
Rams, ewes, and wethers	4,449
Spring lambs	5,606
Total	10,055
Value	$32,553
Goats—	
Number	163
Value	$665
Total value all domestic animals	$3,105,853
Poultry and bees—	
Poultry of all kinds	209,093
Value	$122,299
Colonies of bees	2,542
Value	$8,615

Principal Crops.

	Acres	Bushels
Corn	411	9,791
Oats	247	9,424
Wheat	376	10,198
Barley	8,903	200,893
Dry edible beans	706	8,810
Potatoes	1,085	105,617

Hay and forage—	Acres	Tons
Timothy alone	34	46
Clover alone	226	355
Alfalfa	3,073	11,486
Other tame and cultivated grasses	2,275	2,606
Wild, salt, or prairie grasses	1,203	1,352
Grains cut green	76,399	109,051
All other hay and forage	343	2,110
Totals	83,553	127,006

Poultry products—	
Poultry raised, number	233,729
Eggs produced, dozen	1,166,782
Value poultry and eggs produced	$410,877
Honey and wax—	
Honey produced, pounds	77,252
Wax produced, pounds	842
Value honey and wax produced	$6,203
Wool—	
Wool, fleeces shorn	4,765
Value wool and mohair produced	$3,596

Special crops—	
Potatoes, acres	1,085
All other vegetables, acres	4,241
Sugar beets, acres	1,135

Orchard fruits—	Number bearing trees
Apples	102,841
Apricots	783,585
Cherries	173,002
Peaches and nectarines	437,677
Pears	142,550
Prunes and plums	3,387,455
Total	5,043,766

Tropical fruits—	Number bearing trees
Figs	985
Lemons	996
Oranges	1,905
Pomeloes	57
Olives	13,945
Total	18,023

Grapevines—	
Number in bearing	5,584,480
Small fruits—	
Strawberries, acres	460
Blackberries and dewberries, acres	228
All others, acres	323
Total	1,011

Nuts—	Number bearing trees
Almonds	25,862
Pecans	136
Walnuts	19,070
Total	48,398

Irrigation.

Number of farms irrigated in 1909	1,101
Acres irrigated in 1909	37,637
Acreage enterprises were capable of irrigating in 1910	50,939
Acreage included in projects	60,140
Main ditches, number	458
Length, miles	228
Laterals, number	39
Length, miles	27
Flowing wells, number	438
Pumped wells, number	800
Cost of irrigation enterprises up to July 1, 1910	$1,337,216
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$26.25

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	10,096	$57,784
Magnesite, tons	7,623	74,607
Mineral water, gallons	38,400	16,770
Petroleum, barrels	16,617	11,067
Quicksilver, flasks	4,386	376,319
Stone, miscellaneous	-------	98,342
Other minerals	-----	340
Total	-----	$635,229
Number of mineral springs		12

SANTA CRUZ COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1916 (estimated)
Land area, 435 square miles.	Population	19,270	21,512	26,140	------
County seat, Santa Cruz (city).	Population	5,596	5,659	11,146	14,594

Population per square mile, 60.1.

	Highest	Lowest		Inches		Inches
Elevation, 20 feet. 1916: Temperature	90	27	Rainfall	34.13	Snow	0

Santa Cruz fronts its entire length on the Pacific Ocean. It is separated from San Mateo and Santa Clara counties by the Santa Cruz Mountains, and from Monterey County by the Pajaro River. It is one of the smallest counties, and comprises a narrow strip of mountainous land about 40 miles long and 18 miles broad, forming a vast amphitheater, and sloping from the summits of the Santa Cruz range, whose highest elevation, Loma Prieta, is 4,000 feet, southward and westward to the bay of Monterey.

The curving line of shore and the corresponding curve of the mountain line inclose an irregular, crescent-shaped tract of country, with an average width of 20 miles. The sides of the mountain are closely set with forests of pine, redwood, madrone, and other trees, the redwoods having in many cases, attained gigantic growth.

The extent of the apple industry is shown by statistics, and is one of the most valuable industries. During the harvesting of the crop in the Pajaro Valley, this industry gives employment to several thousands. The annual shipments of green apples average from 3,500 to 4,000 carloads, and evaporated apples, about 150 to 200 carloads. Growers receive from $20 to $25 per ton delivered at the packing house. The leading varieties are Newtown Pippin, Bellflower, Red Pearmain, White Pearmain, Missouri Pippin, Baldwin, Rome Beauty, Spitzenberg, Winesap, Langford Seedling, and Ben Davis.

The apple crop of 1916 amounted to 3,600 cars, represented as follows: Newtown Pippins, 2,100; Bellflowers, 900, and other varieties, 600 cars. An ordinary car is 640 boxes. The average price for the entire crop would be about 65 cents to 70 cents per packed box. The average price received was somewhat better than in 1915.

Of the small fruits, the strawberry is the most widely grown and furnishes a crop from about April 1 to December 1, about 270 carloads being shipped in 1914.

In the southern part of the county a large acreage is devoted to the profitable growth of sugar beets, potatoes, beans, and onions.

Asparagus and rhubarb are grown for outside markets.

Seeds, bulbs, plants, and cut flowers are cultivated on a large scale.

This is one of the few places in the state where ginseng is cultivated. The exports of this root in 1914 from the United States to Hong Kong, the principal market, was about two-thirds cultivated and the remainder wild.

The Santa Cruz Portland cement plant has the largest capacity for the manufacture of cement of any in the state. There is a cold storage plant at Watsonville with a capacity of 500 carloads.

The fish hatchery at Brookdale, on Clear Creek, which was established in 1905, produces large quantities of steelhead trout and also of quinnat salmon and silver salmon.

SANTA CRUZ COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	18
3 to 9 acres	226
10 to 19 acres	198
20 to 49 acres	384
50 to 99 acres	293
100 to 174 acres	188
175 to 259 acres	60
260 to 499 acres	52
500 to 999 acres	25
1,000 acres and over	22
Total	1,466
Total in 1900	1,274

Land and Farm Areas.

Approximate land, acres	278,400
Land in farms in 1910	157,308
Land in farms in 1900	160,438
Improved land in farms in 1910	66,875
Improved land in farms in 1900	62,849
Woodland in farms	44,157
Other unimproved land	46,276

Value of all Farm Property.

Total value in 1910	$17,653,136
Total value in 1900	11,443,150
Per cent increase 1900-1910	54.3
Land in 1910	14,103,715
Land in 1900	9,094,410
Buildings in 1910	2,299,890
Buildings in 1900	1,452,020
Implements and machinery in 1910	461,107
Implements and machinery in 1900	246,930
Domestic animals, poultry and bees in 1910	788,424
Domestic animals, poultry and bees in 1900	649,790

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	4,210
Other cows	1,811
Yearling heifers	1,113
Calves	1,779
Yearling steers and bulls	438
Other steers and bulls	749
Total	10,100
Value	$259,560
Horses—	
Mature horses	3,914
Yearling colts	260
Spring colts	116
Total	4,290
Value	$435,787
Mules—	
Mature mules	84
Yearling colts	4
Total	88
Value	$8,150
Asses and burros—	
Number	6
Value	$125
Swine—	
Mature hogs	2,165
Spring pigs	1,509
Total	3,674
Value	$27,421
Sheep—	
Rams, ewes and wethers	876
Spring lambs	703
Total	1,579
Value	$5,354
Goats—	
Number	1,043
Value	$3,230
Total value all domestic animals	$739,727
Poultry and bees—	
Poultry of all kinds	85,705
Value	$46,054
Colonies of bees	693
Value	$2,643

Principal Crops.

	Acres	Bushels
Corn	1,136	22,284
Oats	2,282	59,812
Wheat	217	3,629
Barley	1,000	34,226
Dry edible beans	577	12,645
Potatoes	1,080	128,977

Hay and forage—	Acres	Tons
Timothy alone	350	450
Clover alone	70	170
Alfalfa	255	1,090
Other tame and cultivated grasses	28	36
Wild, salt, or prairie grasses	29	29
Grains cut green	16,609	22,376
All other hay and forage	696	1,093
Totals	18,037	25,244

Poultry products—	
Poultry raised, number	79,015
Eggs produced, dozen	577,989
Value of poultry and eggs produced	$188,542
Honey and wax—	
Honey produced, pounds	11,032
Wax produced, pounds	98
Value of honey and wax produced	$1,207
Wool—	
Wool, fleeces shorn	799
Mohair and goat hair, fleeces shorn	630
Value of wool and mohair produced	$1,444
Special crops—	
Potatoes, acres	1,080
Sweet potatoes, acres	1
All other vegetables, acres	648
Sugar beets, acres	312

SANTA CRUZ COUNTY SUMMARY.—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	647,136
Apricots	63,021
Cherries	17,608
Peaches and nectarines	11,868
Pears	23,100
Prunes and plums	112,269
Total	875,642

Tropical fruits—	Number bearing trees
Figs	333
Lemons	349
Oranges	330
Pomeloes	7
Olives	1,243
Total	2,279

Grapevines—	
Number in bearing	1,365,414

Small fruits—	
Strawberries, acres	489
Blackberries and dewberries, acres	116
All others, acres	139
Total	744

Nuts—	Number bearing trees
Almonds	240
Pecans	5
Walnuts	4,015
Total	4,757

Irrigation.

Number of farms irrigated in 1909	106
Acres irrigated in 1909	1,201
Acreage enterprises were capable of irrigating in 1910	1,313
Acreage included in projects	2,232
Main ditches, number	81
Length, miles	41
Flowing wells, number	2
Pumped wells, number	58
Cost of irrigation enterprises up to July 1, 1910	$76,621
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$58.36

Mineral Production in 1915.

Substance	Amount	Value
Bituminous rock, tons	17,399	$60,728
Lime, barrels	191,643	177,873
Limestone, tons	2,047	4,873
Stone, miscellaneous		6,794
Other minerals		1,331,263
Total		$1,581,531
Number of mineral springs		3

SHASTA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 3,858 square miles.	Population	12,133	17,318	18,920	------
County seat, Redding (city).	Population	1,821	2,946	3,572	4,800
Population per square mile, 4.9.					

	Highest	Lowest		Inches		Inches
Elevation, 552 feet. 1916: Temperature	110	24	Rainfall	38.42	Snow	22.0

Shasta County lies at the head of the famous Sacramento Valley. One mile north of Redding, the county seat, the valley ends and the canyon, second only in fame to the valley, which bears the name of the great waterway in the state, begins.

Covering a portion of eastern Shasta are the Sierra Nevada Mountains and on the northeastern boundary is the Coast Range. These are lofty, some peaks exceeding 5,000 feet in height, and are very rugged. On the extreme eastern border of the county is Lassen Peak, raising its mighty head 10,577 feet above sea level. This peak has attracted much attention in recent years owing to numerous great eruptions. This mountain is timbered two-thirds of the way up. Hot and boiling springs and others noted for their medicinal qualities, abound in this region. The southwestern portion of this section is a succession of rounded hills, varying in height from 50 to 200 feet, while the central and southern portions consist of tablelands, varying in altitude from 500 to 700 feet. Fertile valleys predominate.

Shasta is noted for the number and beauty of its streams. First in importance is the Sacramento River, which enters the county on its northern boundary, traversing it throughout to its southern borders. The Sacramento is augmented by the combined McCloud, Pit, and Fall rivers, the former finding its source at Mount Shasta on the extreme north, enters the county and travels in a southerly direction, emptying into the Pit, which earlier has received the Fall River flow, and continuing still in a southerly course meets and enters the Sacramento at a point a few miles north of Kennett. Most beautiful of all northern streams is the Fall River.

Beautiful resorts and springs abound. The mountains are heavily timbered with sugar pine, cedar, fir, and other valuable timbers.

The prune, peach, pear, and plum thrive, while grapes have proven a success in the valley districts.

Anderson, twelve miles south of Redding, the fruit and lumber center of the county, and Kennett, seventeen miles to the north of the county seat, are the two next important centers.

Shasta's pre-eminence in mineral production, giving her the title of "banner county," is largely due to her immense copper output.

(*Information supplied by the Chamber of Commerce.*)

While dry farming is carried on successfully irrigation is being inaugurated in different sections of the county. An irrigation system to irrigate about 30,000 acres, under what is known as the Anderson-Cottonwood Irrigation District, is being built this year.

Redding, the county seat of Shasta County, lies at the extreme head of the Sacramento Valley and on account of its advantageous position is the commercial center of both the mining and agricultural industries. The olive is extensively grown and has become an important factor in the growth of the county.

SHASTA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	16
10 to 19 acres	29
20 to 49 acres	103
50 to 99 acres	111
100 to 174 acres	300
175 to 259 acres	96
260 to 499 acres	190
500 to 999 acres	93
1,000 acres and over	66
Total	1,010
Total in 1900	1,221

Land and Farm Areas.

Approximate land, acres	2,469,120
Land in farms in 1910	389,218
Land in farms in 1900	347,120
Improved land in farms in 1910	96,217
Improved land in farms in 1900	86,540
Woodland in farms	151,113
Other unimproved land	141,888

Value of all Farm Property.

Total value in 1910	$7,847,929
Total value in 1900	4,420,423
Per cent increase 1900-1910	77.5
Land in 1910	5,403,079
Land in 1900	2,980,620
Buildings in 1910	851,750
Buildings in 1900	538,500
Implements and machinery in 1910	289,511
Implements and machinery in 1900	163,450
Domestic animals, poultry, and bees in 1910	1,303,589
Domestic animals, poultry, and bees in 1900	737,853

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	2,923
Other cows	15,433
Yearling heifers	3,678
Calves	3,308
Yearling steers and bulls	3,197
Other steers and bulls	5,580
Total	34,119
Value	$677,694
Horses—	
Mature horses	4,516
Yearling colts	488
Spring colts	213
Total	5,217
Value	$396,414
Mules—	
Mature mules	224
Yearling colts	57
Spring colts	13
Total	294
Value	$23,225
Asses and burros—	
Number	23
Value	$2,635
Swine—	
Mature hogs	12,832
Spring pigs	5,968
Total	18,800
Value	$96,329
Sheep—	
Rams, ewes, and wethers	11,449
Spring lambs	5,574
Total	17,023
Value	$44,945
Goats—	
Number	18,403
Value	$41,501
Total value all domestic animals	$1,282,743
Poultry and bees—	
Poultry of all kinds	35,873
Value	$19,226
Colonies of bees	689
Value	$1,620

Principal Crops.

	Acres	Bushels
Corn	163	4,655
Oats	723	8,915
Wheat	3,783	45,022
Barley	1,298	21,551
Dry edible beans	49	685
Potatoes	243	27,756
Hay and forage—	Acres	Tons
Timothy alone	3,083	4,118
Timothy and clover mixed	2,165	2,847
Clover alone	269	530
Alfalfa	6,698	16,874
Other tame and cultivated grasses	917	1,077
Wild, salt, or prairie grasses	13,158	12,716
Grains cut green	8,525	7,836
All other hay and forage	526	580
Total	35,341	46,578

Poultry products—	
Poultry raised, number	52,607
Eggs produced, dozen	199,858
Value poultry and eggs produced	$73,767
Honey and wax—	
Honey produced, pounds	8,466
Wax produced, pounds	185
Value of honey and wax produced	$1,013
Wool—	
Wool, fleeces shorn	17,862
Mohair and goat hair, fleeces shorn	11,606
Value wool and mohair produced	$25,705
Special crops—	
Potatoes, acres	243
Sweet potatoes, acres	16
All other vegetables, acres	577

SHASTA COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	35,440
Apricots	839
Cherries	2,785
Peaches and nectarines	98,950
Pears	33,952
Prunes and plums	87,959
Total	262,136

Tropical fruits—	Number bearing trees
Figs	2,306
Lemons	7
Oranges	55
Olives	9,616
Total	11,986

Grapevines—	
Number in bearing	117,481

Small fruits—	
Strawberries, acres	44
Blackberries and dewberries, acres	32
All others, acres	19
Total, acres	95

Nuts—	Number bearing trees
Almonds	8,056
Pecans	7
Walnuts	1,168
Total	9,339

Irrigation.

Number of farms irrigated in 1909	639
Acres irrigated in 1909	33,004
Acreage enterprises were capable of irrigating in 1910	36,564
Acreage included in projects	72,653
Main ditches, number	446
Length, miles	678
Laterals, number	130
Length, miles	81
Flowing wells, number	2
Pumped wells, number	34
Cost of irrigation enterprises up to July 1, 1910	$430,766
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$11.78

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	1,836	$11,550
Chrome, tons	1,757	17,570
Copper, pounds	30,828,917	5,395,060
Gold	--------	1,120,848
Lead, pounds	180,936	8,504
Limestone, tons	44,953	40,945
Mineral water, gallons	12,000	1,800
Silver	--------	459,566
Stone, miscellaneous	--------	1,418
Zinc, pounds	8,378,401	1,038,922
Other minerals*	--------	253,950
Total	--------	$8,350,133
Number of mineral springs		16

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*Includes iron ore, pyrite and lime.

SIERRA COUNTY.

Date of creation, April 16, 1852.

		1890	1900	1910
Land area, 923 square miles.	Population	5,051	4,017	4,098
County seat, Downieville (township).	Population	-----	-----	751
Population per square mile, 4.4.				

	Temperature Highest	Temperature Lowest	Rainfall Inches	Snow Inches
Elevation, 3,150 feet. 1916:	102	6	75.32	159.7

Sierra County has an area practically all mountainous. The altitude ranges from 2,000 to 8,600 feet, the highest elevation being that of the Sierra Buttes, but the greater portion has an elevation of from 4,000 to 5,000 feet.

The main ridge of the Sierra Nevada crosses the eastern part from south to north. Several spurs traverse the county from east to west, forming the watersheds of the four principal streams which make the drainage system of the western part. These streams consist of the Middle Yuba River on the south, the North Yuba near the center, and Canyon Creek and Slate Creek on the north, and in the eastern end the many streams that form the headwaters of the Feather and Truckee rivers. Of the peculiar topographical features are the expansive valleys and lakes, lying among the loftiest peaks of the Sierra. The lakes vary from one-eighth of a mile to three or four miles in length, most of them circular, and, considering their small size, are remarkable for their depth.

The important body of agricultural land is Sierra Valley. It extends over the boundary line into Plumas County, and is the largest and the most elevated of the valley of the Sierra, being 4,750 feet above sea level. It is 30 miles in length and 10 miles in width. This valley is particularly adapted to stock raising and dairy purposes. There are several creameries in the valley. The soil is deep, black loam, largely admixed with rich mold.

Since 1849, the principal industry has been gold mining.

The greater portion is practically covered with a virgin belt of soft timber. The lumber cut runs into many millions of feet.

SIERRA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	6
10 to 19 acres	3
20 to 49 acres	4
50 to 99 acres	5
100 to 174 acres	25
175 to 259 acres	4
260 to 499 acres	19
500 to 999 acres	18
1,000 acres and over	25
Total	110
Total in 1900	141

Land and Farm Areas.

Approximate land, acres	590,720
Land in farms in 1910	84,220
Land in farms in 1900	74,609
Improved land in farms in 1910	30,794
Improved land in farms in 1900	26,687
Woodland in farms	18,168
Other unimproved land	35,258

Value of all Farm Property.

Total value in 1910	$1,650,799
Total value in 1900	995,395
Per cent increase 1900-1910	65.8
Land in 1910	962,575
Land in 1900	564,990
Buildings in 1910	262,125
Buildings in 1900	179,770
Implements and machinery in 1910	65,524
Implements and machinery in 1900	37,480
Domestic animals, poultry and bees in 1910	360,575
Domestic animals, poultry and bees in 1900	213,155

SIERRA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	1,563
Other cows	2,268
Yearling heifers	850
Calves	874
Yearling steers and bulls	831
Other steers and bulls	1,401
Total	7,787
Value	$199,156
Horses—	
Mature horses	1,199
Yearling colts	155
Spring colts	40
Total	1,394
Value	$136,605
Mules—	
Mature mules	20
Value	$1,450
Asses and burros—	
Number	4
Value	$325
Swine—	
Mature hogs	370
Spring pigs	294
Total	664
Value	$4,198
Sheep—	
Rams, ewes and wethers	3,005
Spring lambs	93
Total	3,098
Value	$15,579
Goats—	
Number	73
Value	$184
Total value all domestic animals	$357,497
Poultry and bees—	
Poultry of all kinds	4,458
Value	$2,950
Colonies of bees	49
Value	$128

Principal Crops.

	Acres	Bushels
Corn	1	40
Oats	526	11,431
Wheat	383	6,389
Barley	466	7,362
Potatoes	46	5,016
Hay and forage—	Acres	Tons
Timothy alone	388	570
Timothy and clover mixed	1,789	2,020
Clover alone	26	37
Alfalfa	1,125	1,712
Other tame and cultivated grasses	839	922
Wild, salt, or prairie grasses	15,772	16,253
Grains cut green	683	720
Totals	20,622	22,234

Poultry products—	
Poultry raised, number	6,993
Eggs produced, dozen	24,877
Value poultry and eggs produced	$11,788
Honey and wax—	
Honey produced, pounds	2,081
Wax produced, pounds	10
Value of honey and wax produced	$220
Wool—	
Wool, fleeces shorn	2,333
Value wool and mohair produced	$3,940
Special crops—	
Potatoes, acres	46
All other vegetables, acres	35

Orchard fruits—	Number bearing trees
Apples	3,398
Cherries	67
Peaches and nectarines	157
Pears	148
Prunes and plums	232
Total	4,002

Small fruits—	
Strawberries, acres	2
Blackberries and dewberries, acres	1
All others, acres	3
Total	6

Nuts—	Number bearing trees
Walnuts	24

Irrigation.

Number of farms irrigated in 1909	94
Acres irrigated in 1909	17,504
Acreage enterprises were capable of irrigating in 1910	17,505
Acreage included in projects	18,249
Main ditches, number	119
Length, miles	150
Laterals, number	4
Length, miles	1
Cost of irrigation enterprises up to July 1, 1910	$69,650
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$3.98

Mineral Production in 1915.

Substance	Value
Gold	$726,362
Silver	3,156
Total	$729,518
Number of mineral springs	2

SISKIYOU COUNTY.

Date of creation, March 22, 1852.

		1890	1900	1910	1915 (estimated)
Land area, 6,256 square miles.	Population--	12,163	16,962	18,801	------
County seat, Yreka (town).	Population--	1,100	1,254	1,134	1,500
Population per square mile, 3.0.					

Sisson (Station):		Highest	Lowest		Inches		Inches
Elevation, 3,555 feet.	1916: Temperature---	95	--1	Rainfall---	33.06	Snow-	212.0

Siskiyou is one of the northern counties of the state, adjoining Oregon for 80 miles on the north. Of its area of 6,256 square miles, 1,500 square miles are valley; the remainder is mountains and forest. Much of the agricultural land is farmed without irrigation, producing good crops of wheat, barley, and in some localities alfalfa and timothy. The so-called desert lands were long considered of little value save for pasturage, but are now being successfully farmed, and require only the application of water to produce abundant crops.

The agricultural lands are chiefly comprised in Scott Valley in the western portion of the county, Shasta Valley and Little Shasta in the central portion, and McCloud and Butte valleys in the eastern portion.

Timber is everywhere; there are thousands of sections that will cut from ten to twenty million feet of yellow and sugar pine, besides large quantities of red fir and cedar.

The Sierra Nevada and Coast Range mountains meet here. The altitude ranges from 2,000 feet in the valleys to 14,000 feet on the mountain peaks, the highest of these being Mount Shasta. There are localities where snow seldom falls, and regions of perpetual snow. These conditions make it one of the most scenic of the counties.

The Marble Mountains, now but little known to tourists, will in time rival the Kings River Canyon and the Yosemite Valley. Chief among the noted resorts are the famous Shasta Springs and Upper Soda Springs, all situated in the Sacramento River Canyon, just over the border of Shasta County. At Sisson, at the base of Mount Shasta, the largest fish hatchery in the United States is located.

Lumbering is the chief industry, with mining and live stock a close second and third.

SISKIYOU COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	21
10 to 19 acres	36
20 to 49 acres	88
50 to 99 acres	98
100 to 174 acres	388
175 to 259 acres	84
260 to 499 acres	199
500 to 999 acres	124
1,000 acres and over	75
Total	1,114
Total in 1900	931

Land and Farm Areas.

Approximate land, acres	4,003,840
Land in farms in 1910	455,876
Land in farms in 1900	452,859
Improved land in farms in 1910	186,147
Improved land in farms in 1900	181,029
Woodland in farms	82,544
Other unimproved land	187,185

Value of all Farm Property.

Total value in 1910	$14,270,302
Total value in 1900	7,704,769
Per cent increase 1900-1910	85.2
Land in 1910	10,352,935
Land in 1900	5,084,110
Buildings in 1910	1,411,810
Buildings in 1900	1,056,390
Implements and machinery in 1910	420,745
Implements and machinery in 1900	284,520
Domestic animals, poultry, and bees in 1910	2,084,812
Domestic animals, poultry, and bees in 1900	1,279,749

SISKIYOU COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	7,018
Other cows	14,781
Yearling heifers	5,965
Calves	4,919
Yearling steers and bulls	5,359
Other steers and bulls	6,513
Total	45,079
Value	*$1,010,902
Horses—	
Mature horses	7,690
Yearling colts	1,037
Spring colts	423
Total	9,150
Value	$834,467
Mules—	
Mature mules	390
Yearling colts	76
Spring colts	37
Total	503
Value	$44,929
Asses and burros—	
Number	22
Value	$4,610
Swine—	
Mature hogs	6,116
Spring pigs	3,396
Total	9,512
Value	$58,475
Sheep—	
Rams, ewes, and wethers	18,013
Spring lambs	11,909
Total	29,922
Value	$99,082
Goats—	
Number	384
Value	$1,079
Total value all domestic animals	$2,053,544

Poultry and bees—	
Poultry of all kinds	43,413
Value	$22,568
Colonies of bees	2,775
Value	$8,700

Principal Crops.

	Acres	Bushels
Corn	89	3,165
Oats	3,148	93,076
Wheat	17,872	224,512
Barley	4,282	60,118
Dry edible beans	10	272
Potatoes	655	76,218

Hay and forage—	Acres	Tons
Timothy alone	1,278	2,671
Timothy and clover mixed	12,792	23,178
Clover alone	168	405
Alfalfa	22,492	48,478
Other tame and cultivated grasses	3,432	5,459
Wild, salt, or prairie grasses	10,114	12,913
Grains cut green	7,651	6,831
All other hay and forage	49	178
Totals	57,976	100,113

Poultry products—	
Poultry raised, number	57,444
Eggs produced, dozens	254,107
Value poultry and eggs produced	$93,177
Honey and wax—	
Honey produced, pounds	85,322
Wax produced, pounds	324
Value of honey and wax produced	$8,317
Wool—	
Wool, fleeces shorn	14,975
Mohair and goat hair, fleeces shorn	134
Value wool and mohair produced	$23,038
Special crops—	
Potatoes, acres	655
All other vegetables, acres	673
Sugar beets, acres	128

Orchard fruits—	Number bearing trees
Apples	31,055
Apricots	356
Cherries	1,850
Peaches and nectarines	4,371
Pears	2,300
Prunes and plums	5,683
Total	45,615

Tropical fruits—	Number bearing trees
Figs	3
Lemons	2
Total	5

Grapevines—	
Number in bearing	2,473
Small fruits—	
Strawberries, acres	7
Blackberries and dewberries, acres	10
All others, acres	14
Total	31

Nuts—	Number bearing trees
Almonds	83
Pecans	2
Walnuts	30
Total	185

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*Includes animals, age and sex not specified.

Irrigation.

Number of farms irrigated in 1909	636
Acres irrigated in 1909	60,301
Acreage enterprises were capable of irrigating in 1910	66,866
Acreage included in projects	79,161
Main ditches, number	595
Length, miles	688
Laterals, number	172
Length, miles	41
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$370,627
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$5.54

Mineral Production in 1915.*

Substance	Amount	Value
Gold	------	$426,716
Lead, pounds	188	9
Lime, barrels	745	745
Mineral water, gallons	626,680	62,990
Silver	------	2,081
Stone, miscellaneous	------	4,630
Other minerals†	------	16,923
Total	------	$514,094
Number mineral springs		28

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*The coal deposits north of Yreka, in the vicinity of Hornbrook and Ager, have furnished a small amount of coal for domestic use for several years. It is a good grade of lignite, burns freely and leaves no clinkers.

†Includes chrome, copper, marble, sandstone.

SOLANO COUNTY.

Date of creation, February 18, 1850.

Land area, 822 square miles.
County seat, Fairfield (town).
Population per square mile, 33.5.

	1890	1900	1910	1915 (estimated)
Population	20,946	24,143	27,559	------
Population	-----	-----	834	1,000

Vacaville (Station):		Highest	Lowest		Inches		Inches
Elevation, 175 feet.	1916: Temperature	107	22	Rainfall	36.38	Snow	7.0

In the foothills of the Coast Range on its western border, and extending across broad acres of the fertile land till its eastern confines are marked by the Sacramento River, lies Solano County.

A considerable acreage is devoted to grain raising. Thousands of cattle, horses, and sheep graze on the upland pastures and marsh lands. The soil is unexcelled, even in California, for productiveness. All fruits, especially prunes, peaches, apricots, and pears, grow to perfection; citrus fruits are also raised.

In the eastern section of the county is another rich section, the delta lands of the Sacramento River being noted for their productiveness.

This favored section is of a limited area. From east to west its extreme length is 45 miles, while from north to south the county measures 35 miles.

SOLANO COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	45
10 to 19 acres	60
20 to 49 acres	198
50 to 99 acres	170
100 to 174 acres	167
175 to 259 acres	89
260 to 499 acres	156
500 to 999 acres	144
1,000 acres and over	108
Total	1,143
Total in 1900	1,151

Land and Farm Areas.

Approximate land, acres	526,080
Land in farms in 1910	474,866
Land in farms in 1900	480,551
Improved land in farms in 1910	310,452
Improved land in farms in 1900	344,058
Woodland in farms	44,534
Other unimproved land	119,880

Value of all Farm Property.

Total value in 1910	$28,727,683
Total value in 1900	20,780,434
Per cent increase 1900-1910	38.2
Land in 1910	23,025,081
Land in 1900	16,903,310
Buildings in 1910	2,278,540
Buildings in 1900	1,905,970
Implements and machinery in 1910	767,136
Implements and machinery in 1900	649,320
Domestic animals, poultry and bees in 1910	2,656,926
Domestic animals, poultry and bees in 1900	1,321,834

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	9,279
Other cows	4,257
Yearling heifers	1,933
Calves	3,720
Yearling steers and bulls	1,187
Other steers and bulls	1,408
Total	21,784
Value	$605,378
Horses—	
Mature horses	6,993
Yearling colts	695
Spring colts	362
Total	8,050
Value	$884,500
Mules—	
Mature mules	2,157
Yearling colts	84
Spring colts	78
Total	2,319
Value	$295,866
Asses and burros—	
Number	23
Value	$2,800
Swine—	
Mature hogs	8,836
Spring pigs	4,732
Total	15,568
Value	$89,528

SOLANO COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges —Continued.

Sheep—	
Rams, ewes and wethers	96,921
Spring lambs	73,232
Total	170,153
Value	$737,457
Goats—	
Number	392
Value	$1,218
Total value all domestic animals	$2,616,747
Poultry and bees—	
Poultry of all kinds	74,683
Value	$39,384
Colonies of bees	256
Value	$795

Principal Crops.

	Acres	Bushels
Corn	91	935
Oats	1,306	25,711
Wheat	20,924	391,753
Barley	41,647	1,263,357
Dry edible beans	2,553	65,755
Potatoes	311	42,416

Hay and forage—	Acres	Tons
Timothy alone	2,566	2,856
Timothy and clover mixed	375	381
Clover alone	60	171
Alfalfa	2,145	10,617
Other tame and cultivated grasses	381	636
Wild, salt, or prairie grasses	496	771
Grains cut green	33,641	41,552
All other hay and forage	29	41
Totals	39,693	57,028

Poultry products—	
Poultry raised, number	66,403
Eggs produced, dozen	426,261
Value poultry and eggs produced	$128,295
Honey and wax—	
Honey produced, pounds	2,873
Value of honey and wax produced	$491
Wool—	
Wool, fleeces shorn	157,499
Mohair and goat hair, fleeces shorn	3
Value wool and mohair produced	$161,312
Special crops—	
Potatoes, acres	311
All other vegetables, acres	650
Sugar beets, acres	4

Orchard fruits—	Number bearing trees
Apples	4,862
Apricots	310,262
Cherries	53,923
Peaches and nectarines	341,266
Pears	182,194
Prunes and plums	465,341
Total	1,357,911

Tropical fruits—	Number bearing trees
Figs	4,598
Lemons	126
Oranges	2,950
Pomeloes	15
Olives	1,221
Total	8,911

Grapevines—	
Number in bearing	1,213,265
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	5
All others, acres	2
Total	12

Nuts—	Number bearing trees
Almonds	98,276
Pecans	134
Walnuts	1,806
Total	100,239

Irrigation.

Number of farms irrigated in 1909	150
Acres irrigated in 1909	3,610
Acreage enterprises were capable of irrigating in 1910	7,160
Acreage included in projects	8,192
Main ditches, number	20
Length, miles	22
Pumped wells, number	125
Cost of irrigation enterprises up to July 1, 1910	$135,532
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$18.93

Mineral Production in 1915.

Substance	Amount	Value
Mineral water, gallons	64,200	$8,000
Stone, miscellaneous		37,576
Other minerals*		1,290,347
Total		$1,335,923
Number of mineral springs		2

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*Includes cement, fuller's earth, natural gas, quicksilver, salt.

SONOMA COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 1,577 square miles.	Population	32,721	38,480	48,394	------
County seat, Santa Rosa (city).	Population	5,220	6,673	7,817	11,000

Population per square mile, 30.7.

		Highest	Lowest		Inches		Inches
Elevation, 181 feet.	1916: Temperature	97	21	Rainfall	32.35	Snow	0

Sonoma County is bounded on the west by the Pacific Ocean, for more than 65 miles that boundary conforming to the irregularities of the shore, while on San Pablo Bay it has a frontage of 20 miles.

The great central valley extends the entire length of the county from south to north. The area on which rough stone interferes with farming operations is small. Out of the area of land in the county at least 200,000 acres are valley land, the richest soil known, being a black loam; 200,000 acres are rolling, or higher tableland, of exceedingly rich, alluvial, brown soil, with considerable sand. This is the best fruit land. At least 100,000 acres of mountain land are adapted to grazing, and about 80,000 acres are covered with redwood timber of a magnificent growth.

Sonoma Valley is about 20 miles in length, with an average width of 8 miles. It lies parallel to Petaluma Valley, from which it is separated by a range of mountains.

The streams and watercourses of Sonoma County are numerous. Russian River, the largest stream, enters on the north, flows in a southeasterly direction for 20 miles, turns at Fitch Mountain and finds its way to the largest depression in the Santa Rosa Basin, from which it breaks through a gap in the Coast Range to the Pacific Ocean. This river gathers the waters from three-fifths of the area of the county. Owing to the abundant rainfall little or no irrigation is required, as is the case in some of the valley counties.

Sonoma County has a large acreage in wine grapes, most of which are made into dry wines. The average price for grapes in 1914 was $15 to $17 per ton, according to varieties. Beside wine, fruit, dairy and stock industries, the county produces more poultry and eggs than any other part of the state. Olive culture is increasing. Sonoma and Sacramento counties are the largest producers of hops in the state. In 1912 Sonoma produced 35,712 bales of hops, in 1914, 24,284 bales, and in 1915, 29,790 bales.

Cattle are raised on a large scale, principally for dairying purposes. The breeds of milch cows represented are mostly Jerseys, Holsteins, and Ayrshires, with some strains of Durhams and fine American breeds.

SONOMA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	40
3 to 9 acres	916
10 to 19 acres	890
20 to 49 acres	1,040
50 to 99 acres	522
100 to 174 acres	508
175 to 259 acres	233
260 to 499 acres	299
500 to 999 acres	202
1,000 acres and over	122
Total	4,772
Total in 1900	3,676

Land and Farm Areas.

Approximate land, acres	1,009,280
Land in farms in 1910	744,644
Land in farms in 1900	785,064
Improved land in farms in 1910	248,271
Improved land in farms in 1900	221,374
Woodland in farms	278,507
Other unimproved land	217,866

Value of all Farm Property.

Total value in 1910	$55,351,049
Total value in 1900	33,071,707
Per cent increase 1900-1910	67.4
Land in 1910	41,512,706
Land in 1900	25,286,750
Buildings in 1910	8,758,787
Buildings in 1900	4,646,580
Implements and machinery in 1910	1,326,832
Implements and machinery in 1900	847,240
Domestic animals, poultry, and bees in 1910	3,752,724
Domestic animals, poultry, and bees in 1900	2,291,137

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	24,961
Other cows	5,835
Yearling heifers	4,804
Calves	9,517
Yearling steers and bulls	1,805
Other steers and bulls	1,705
Total	48,727
Value	*$1,166,971
Horses—	
Mature horses	12,611
Yearling colts	733
Spring colts	384
Total	13,728
Value	$1,355,510
Mules—	
Mature mules	388
Yearling colts	8
Spring colts	2
Total	398
Value	$48,025
Asses and burros—	
Number	28
Value	$620
Swine—	
Mature hogs	10,995
Spring pigs	7,428
Total	18,423
Value	$125,448
Sheep—	
Rams, ewes, and wethers	44,095
Spring lambs	21,220
Total	65,315
Value	$224,274
Goats—	
Number	2,991
Value	7,962
Total value all domestic animals	$2,928,810
Poultry and bees—	
Poultry of all kinds	1,362,399
Value	$821,299
Colonies of bees	824
Value	$2,615

Principal Crops.

	Acres	Bushels
Corn	1,681	44,331
Oats	468	20,156
Wheat	56	1,445
Barley	361	8,795
Dry edible beans	7	83
Potatoes	2,279	161,597

Hay and forage—	Acres	Tons
Timothy alone	50	68
Timothy and clover mixed	22	40
Clover alone	251	370
Alfalfa	5,565	10,461
Other tame and cultivated grasses	1,509	1,842
Wild, salt, or prairie grasses	6,507	7,346
Grains cut green	47,021	65,919
All other hay and forage	1,426	1,903
Totals	62,351	87,949

Poultry products—	
Poultry raised, number	1,512,601
Eggs produced, dozens	9,470,880
Value poultry and eggs produced	$3,038,518
Honey and wax—	
Honey produced, pounds	7,014
Wax produced, pounds	44
Value of honey and wax produced	$941
Wool—	
Wool, fleeces shorn	75,925
Mohair and goat hair, fleeces shorn	2,330
Value wool and mohair produced	$74,951
Special crops—	
Potatoes, acres	2,279
All other vegetables, acres	954

Orchard fruits—	Number bearing trees
Apples	386,740
Apricots	9,087
Cherries	43,927

*Includes animals, age and sex not specified.

SONOMA COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Peaches and nectarines	237,220
Pears	109,965
Prunes and plums	569,232
Total	1,364,105
Tropical fruits—	Number bearing trees
Figs	3,850
Lemons	396
Oranges	5,047
Pomeloes	8
Olives	10,863
Total	20,226
Grapevines—	
Number in bearing	17,939,972
Small fruits—	
Strawberries, acres	103
Blackberries and dewberries, acres	930
All others, acres	438
Total	1,471
Nuts—	Number bearing trees
Almonds	2,893
Pecans	43
Walnuts	11,955
Total	16,631

Irrigation.

Number of farms irrigated in 1909	38
Acres irrigated in 1909	631
Acreage enterprises were capable of irrigating in 1910	761
Acreage included in projects	951
Main ditches, number	32
Length, miles	21
Pumped wells, number	11
Cost of irrigation enterprises up to July 1, 1910	$13,801
Average cost per acre irrigation enterprises were capable of irrigating in 1910	18.14

Mineral Production in 1915.

Substance	Amount	Value
Magnesite, tons	3,624	$34,788
Mineral water, gallons	258,600	41,231
Quicksilver, flasks	159	21,793
Stone, miscellaneous	------	177,917
Other minerals	------	375
Total	------	$276,104
Number of mineral springs		21

STANISLAUS COUNTY.

Date of creation, April 1, 1854.

		1890	1900	1910	1915 (estimated)
Land area, 1,450 square miles.	Population	10,040	9,550	22,522	------
County seat, Modesto (city).	Population	2,402	2,024	4,034	7,200
Population per square mile, 15.5.					

Newman (Station):		Highest	Lowest		Inches		Inches
Elevation, 91 feet.	1916: Temperature	105	21	Rainfall	14.00	Snow	4.0

Stanislaus County lies in the northern end of the great San Joaquin Valley, 114 miles from San Francisco and 30 miles from tidewater on the San Joaquin River. It is bounded by the Sierra Nevada Mountains on the east and the Coast Range Mountains on the west. The county is drained by three large rivers, the Stanislaus, the Tuolumne, and the San Joaquin. The soil ranges from a light sandy loam in the southerly part to a heavy sandy loam in the central part and adobe and redlands in the east. The county is crossed by four lines of railways, while the Sierra road connects Oakdale and vicinity with the mountain counties to the north.

The county has a large acreage in barley, oats and wheat, and is the largest producer of butter in the state, the total quantity in 1914 being 8,184,390 pounds. Fruits also grow well, especially peaches, apricots, and figs.

STANISLAUS COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	13
3 to 9 acres	153
10 to 19 acres	319
20 to 49 acres	1,046
50 to 99 acres	439
100 to 174 acres	192
175 to 259 acres	83
260 to 499 acres	125
500 to 999 acres	142
1,000 acres and over	175
Total	2,687
Total in 1900	951

Land and Farm Areas.

Approximate land, acres	928,000
Land in farms in 1910	649,392
Land in farms in 1900	830,692
Improved land in farms in 1910	512,189
Improved land in farms in 1900	622,700
Woodland in farms	18,756
Other unimproved land	118,447

Value of all Farm Property.

Total in 1910	$43,787,887
Total value in 1900	17,031,950
Per cent increase 1900-1910	157.1
Land in 1910	35,324,743
Land in 1900	13,674,850
Buildings in 1910	3,320,475
Buildings in 1900	1,237,900
Implements and machinery in 1910	820,079
Implements and machinery in 1900	537,280
Domestic animals, poultry and bees in 1910	4,323,090
Domestic animals, poultry and bees in 1900	1,581,920

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	20,678
Other cows	9,047
Yearling heifers	5,294
Calves	7,252
Yearling steers and bulls	2,922
Other steers and bulls	3,765
Total	49,132
Value	*$1,728,698
Horses*—	
Mature horses	11,818
Yearling colts	1,120
Spring colts	619
Total	14,357
Value	*$1,555,290
Mules—	
Mature mules	5,032
Yearling colts	236
Spring colts	174
Total	5,442
Value	$703,567
Asses and burros—	
Number	31
Value	$7,835
Swine—	
Mature hogs	13,610
Spring pigs	9,417
Total	23,027
Value	$158,491

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*Includes animals, age and sex not specified.

STANISLAUS COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Sheep—	
Rams, ewes and wethers	15,874
Spring lambs	7,378
Total	23,252
Value	$86,005
Goats—	
Number	217
Value	575
Total value all domestic animals	$4,240,461
Poultry and bees—	
Poultry of all kinds	128,905
Value	$74,116
Colonies of bees	2,554
Value	$8,423

Principal Crops.

	Acres	Bushels
Corn	662	12,297
Oats	38,546	638,542
Wheat	22,068	258,121
Barley	57,529	828,628
Kafir corn and milo maize	4,448	80,343
Dry edible beans	373	4,395
Potatoes	207	17,502

Hay and forage—	Acres	Tons
Timothy alone	160	40
Clover alone	10	30
Alfalfa	40,917	149,214
Other tame and cultivated grasses	3,350	2,389
Wild, salt, or prairie grasses	7,400	4,976
Grains cut green	16,847	19,633
All other hay and forage	748	2,361
Totals	69,432	178,643

Poultry products—	
Poultry raised, number	121,677
Eggs produced, dozen	648,248
Value of poultry and eggs produced	$237,685
Honey and wax—	
Honey produced, pounds	61,592
Wax produced, pounds	1,371
Value of honey and wax produced	$5,160
Wool—	
Wool, fleeces shorn	22,837
Mohair and goat hair, fleeces shorn	50
Value wool and mohair produced	$22,700
Special crops—	
Potatoes, acres	207
Sweet potatoes, acres	1,647
All other vegetables, acres	1,621

Orchard fruits—	Number bearing trees
Apples	3,680
Apricots	20,451
Cherries	1,182
Peaches and nectarines	154,553
Pears	4,158
Prunes and plums	6,095
Total	190,515

Tropical fruits—	Number bearing trees
Figs	37,676
Lemons	576
Oranges	10,492
Pomelces	18
Olives	5,458
Total	54,291

Grapevines—	
Number in bearing	1,932,302
Small fruits—	
Strawberries, acres	95
Blackberries and dewberries, acres	53
All others, acres	13
Total	161

Nuts—	Number bearing trees
Almonds	33,726
Pecans	25
Walnuts	864
Total	34,701

Irrigation.

Number of farms irrigated in 1909	1,911
Acres irrigated in 1909	84,015
Acreage enterprises were capable of irrigating in 1910	141,785
Acreage included in projects	340,914
Main ditches, number	23
Length, miles	153
Laterals, number	34
Length, miles	274
Pumped wells, number	3
Cost of irrigation enterprises up to July 1, 1910	$4,051,870
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$28.58

Mineral Production in 1915.

Substance	Value
Stone, miscellaneous	$2,250
Other minerals*	189,521
Total	$191,771
Number of mineral springs	2

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*Includes gold, mineral paint, platinum, quicksilver.

SUTTER COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910	1915 (estimated)
Land area, 608 square miles.	Population	5,469	5,886	6,328	------
County seat, Yuba City (town).	Population	-----	-----	1,160	1,700

Population per square mile, 10.4.

Elevation, 57 feet. (No observation station in county. Figures practically the same as for Marysville, Yuba County, which adjoins.)

Almost in the center of the far-famed valley of the Sacramento is located the county of Sutter, the larger portion of which lies between the Sacramento and Feather rivers directly at their confluence. The remaining portion of the county lies east of the Feather River, just south of Bear River. Surrounded by rivers on almost every side, it is evident that the soil of the county is largely river made, the wash of a thousand years from the Sierra Nevada and Coast Range mountains, and is deep and fertile, the equal of any in the whole State of California.

The western portion of Sutter County in particular is being rapidly developed. The large land holdings are being cut up and sold out in small tracts. Meridian is a prosperous little town, located in the western portion of the county, as well as Live Oak, in the northern part, and Nicolaus in the southern division.

The dairy industry is thriving, and there are a number of large creameries.

Sutter County is the home of the Thompson seedless grape, which is being grown so extensively in various valleys of the state. Most other fruits are grown with great success.

SUTTER COUNTY SUMMARY.

Number of Farms Classified by Size.

3 to 9 acres	57
10 to 19 acres	101
20 to 49 acres	142
50 to 99 acres	91
100 to 174 acres	123
175 to 259 acres	84
260 to 499 acres	123
500 to 999 acres	78
1,000 acres and over	74
Total	873
Total in 1900	728

Land and Farm Areas.

Approximate land, acres	389,120
Land in farms in 1910	385,462
Land in farms in 1900	293,287
Improved land in farms in 1910	199,510
Improved land in farms in 1900	206,877
Woodland in farms	13,956
Other unimproved land	171,996

Value of all Farm Property.

Total value in 1910	$19,115,593
Total value in 1900	9,182,731
Per cent increase 1900-1910	108.2
Land in 1910	14,869,242
Land in 1900	6,976,320
Buildings in 1910	2,032,535
Buildings in 1900	$987,700
Implements and machinery in 1910	458,269
Implements and machinery in 1900	313,780
Domestic animals, poultry, and bees in 1910	1,755,547
Domestic animals, poultry, and bees in 1900	904,931

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	6,728
Other cows	3,254
Yearling heifers	1,939
Calves	2,623
Yearling steers and bulls	1,012
Other steers and bulls	823
Total	16,604
Value	*$465,202
Horses—	
Mature horses	4,869
Yearling colts	587
Spring colts	228
Total	5,684
Value	$573,051

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*Includes animals, age and sex not specified.

SUTTER COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Mules—	
Mature mules	1,922
Yearling colts	107
Spring colts	67
Total	2,096
Value	$272,402
Asses and burros—	
Number	20
Value	$6,670
Swine—	
Mature hogs	9,121
Spring pigs	6,008
Total	15,129
Value	$105,752
Sheep—	
Rams, ewes, and wethers	51,135
Spring lambs	38,530
Total	89,665
Value	$284,023
Goats—	
Number	511
Value	$2,031
Total value all domestic animals	$1,709,131
Poultry and bees—	
Poultry of all kinds	68,861
Value	$38,690
Colonies of bees	2,055
Value	$7,726

Principal Crops.

	Acres	Bushels
Corn	761	22,373
Oats	3,568	56,823
Wheat	14,537	176,750
Barley	27,457	491,720
Kafir corn and milo maize	352	7,750
Dry edible beans	2,766	76,201
Potatoes	218	23,419
Hay and forage—	Acres	Tons
Timothy and clover mixed	80	80
Clover alone	415	2,525
Alfalfa	7,388	21,791
Other tame and cultivated grasses	703	1,003
Wild, salt, or prairie grasses	7,466	9,020
Grains cut green	14,744	20,612
All other hay and forage	1,948	1,986
Total	32,744	57,017

Poultry products—	
Poultry raised, number	101,908
Eggs produced, dozens	420,198
Value of poultry and eggs produced	$167,240

Honey and wax—	
Honey produced, pounds	76,812
Wax produced, pounds	745
Value of honey and wax produced	$4,909
Wool—	
Wool, fleeces shorn	149,821
Mohair and goat hair, fleeces shorn	800
Value wool and mohair produced	$110,738
Special crops—	
Potatoes, acres	218
Sweet potatoes, acres	41
All other vegetables, acres	303
Sugar beets, acres	27
Orchard fruits—	Number bearing trees
Apples	5,433
Apricots	5,086
Cherries	1,249
Peaches and nectarines	149,057
Pears	17,911
Prunes and plums	65,723
Total	244,587
Tropical fruits—	Number bearing trees
Figs	4,675
Lemons	602
Oranges	2,427
Pomeloes	18
Olives	3,018
Total	10,741
Grapevines—	
Number in bearing	1,249,923
Small fruits—	
Strawberries, acres	1
Blackberries and dewberries, acres	7
All others, acres	8
Total	16
Nuts—	Number bearing trees
Almonds	61,572
Pecans	11
Walnuts	671
Total	62,289

Irrigation.

Number of farms irrigated in 1909	39
Acres irrigated in 1909	1,173
Acreage enterprises were capable of irrigating in 1910	1,361
Acreage included in projects	1,959
Main ditches, number	13
Length, miles	6
Pumped wells, number	18
Cost of irrigation enterprises up to July 1, 1910	$18,800
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$13.81

Mineral Production.

Sutter shares with Alpine the distinction of being the only section of the state which had no commercial output of some kind of mineral substance during 1914-15. Both clay and coal exist here, but deposits of neither mineral have been placed on a productive basis.

TEHAMA COUNTY.

Date of creation, April 9, 1856.

		1890	1900	1910	1915 (estimated)
Land area, 2,893 square miles.	Population	9,916	10,996	11,401	------
County seat, Red Bluff (city).	Population	2,608	2,750	3,530	5,072

Population per square mile, 3.9.

		Highest	Lowest		Inches		Inches
Elevation, 307 feet. 1916:	Temperature	113	27	Rainfall	20.09	Snow	11.0

(*Information supplied by Chamber of Commerce.*)

General Description. Tehama County occupies the upper or northern portion of the Sacramento Valley. It is 200 miles north of San Francisco and 120 miles north of Sacramento. Part of its eastern boundary follows the summit of the Sierra Nevada Mountains, and its western boundary lies along the summit of the Coast Range. Its greatest length from east to west is 78 miles; its width from north to south, 38 miles.

The Sacramento River is navigable to Red Bluff and steamboats from San Francisco and Sacramento make trips up and down most of the year. The Sacramento River runs through the county from north to south. From this river there is a rise to the east and west until the summit of the mountain range is reached. South of Red Bluff and west of the river lies broad plains, beyond this, rolling hills developing into the foothills of the mountains, and then the mountains themselves, which rise quite abruptly to a height of from 3,000 to 9,000 feet.

Irrigation. Irrigation of the lands in the county is a very important factor in the production of crops, water being pumped from the river, creeks and wells. In the Los Molinos Colony a good-sized gravity system of irrigation is now completed, the water being taken from Mill Creek, by the construction of a dam, and from the same stream there are several other diversions irrigating several thousand acres. From Deer Creek they are irrigating many thousand acres including the Leland Stanford Jr. University Ranch at Vina, Cal. From Antelope Creek water is diverted for use of the city of Red Bluff and for the irrigation of the Cone Ranch and a portion of Los Molinos Colony.

Industries. The principal industries are horticulture, agriculture, stock raising and lumbering. Mining of chrome ore in the western part of the county has become of considerable importance in the building up of the community, and more mines are being opened now on account of the great demand for chrome, caused by the war.

Olives. The growing of olives in the county has developed into an industry that will make the county famous as a producer of fine olives and olive oil. Two plants for pickling olives are now in operation at Corning and we have over 500 acres of bearing trees.

Alfalfa. In agriculture there has been a gradual change from the growing of wheat and other grains, to fruits, alfalfa, etc. Alfalfa, also grain hay, is grown in quantities to feed the stock and supply the demand of the Alfalfa Meal Company, where large quantities of alfalfa are ground into meal and shipped to all parts of the world.

Apples. Apples are grown only in the foothills. The chief apple-producing region of the county is at Manton, 35 miles to the northeast of Red Bluff, where very fine fruit is raised.

Berries and all small fruits do well. They come into the market early and sell readily.

Sheep. Tehama County is one of the principal counties in northern California, if not in the state, in the production of wool and mutton. The favored breeds of sheep are the various types of the Merino for wool, Shropshires and Hampshires for mutton. For both purposes crosses of Lincolns, Cotswolds and Corriedales are bred to a great extent.

Goats. Of late years Angora goats have come into greater favor as they thrive on the brushy hillside, and their wool is in great demand and brings good prices.

Hogs. Hog-raising in Tehama County offers wonderful opportunities. This part of our stock-raising industry has kept pace with our general development, and have shown an increase from 10 to 15 per cent since 1910.

Bees. Bee keeping is steadily increasing in the alfalfa section of the county, and shows a 43 per cent increase in the last five years.

Cattle. There is in Tehama County some of the finest cattle in the state, and the largest cattle company in northern California operates from the county seat. There are some 30,000 head of fine beef and dairy cattle, and one of the finest Holstein dairy herds in the world is being developed and for years has been considered the home of fine Holsteins. This herd is located at the Leland Stanford Jr. University Ranch at Vina.

Faith in Tehama County peaches and prunes grows every year, there being 700 acres of nonbearing peaches and 1,000 acres of young prunes.

TEHAMA COUNTY SUMMARY (Census Reports 1910.)

Number of Farms Classified by Size.

Under 3 acres	7
3 to 9 acres	34
10 to 19 acres	119
20 to 49 acres	198
50 to 99 acres	102
100 to 174 acres	151
175 to 259 acres	51
260 to 499 acres	119
500 to 999 acres	86
1,000 acres and over	139
Total	1,006
Total in 1900	1,055

Land and Farm Areas.

Approximate land, acres	1,851,520
Land in farms in 1910	915,227
Land in farms in 1900	950,763
Improved land in farms in 1910	186,642
Improved land in farms in 1900	269,693
Woodland in farms	206,234
Other unimproved land	522,351

Value of all Farm Property.

Total value in 1910	$16,821,178
Total value in 1900	16,030,104
Per cent increase 1900-1910	4.9
Land in 1910	12,932,446
Land in 1900	11,720,120
Buildings in 1910	1,234,375
Buildings in 1900	2,091,860
Implements and machinery in 1910	$494,932
Implements and machinery in 1900	440,020
Domestic animals, poultry, and bees in 1910	2,159,425
Domestic animals, poultry, and bees in 1900	1,778,104

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	3,462
Other cows	10,691
Yearling heifers	2,646
Calves	3,520
Yearling steers and bulls	2,590
Other steers and bulls	2,400
Total	25,309
Value	$512,747
Horses—	
Mature horses	5,073
Yearling colts	525
Spring colts	278
Total	5,876
Value	$464,472
Mules—	
Mature mules	1,409
Yearling colts	163
Spring colts	103
Total	1,675
Value	$171,979

TEHAMA COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Asses and burros—	
Number	23
Value	$7,880
Swine—	
Mature hogs	10,915
Spring pigs	4,025
Total	14,940
Value	$75,941
Sheep—	
Rams, ewes, and wethers	185,023
Spring lambs	112,713
Total	297,736
Value	$850,456
Goats—	
Number	28,473
Value	$36,325
Total value all domestic animals	$2,119,800
Poultry and bees—	
Poultry of all kinds	59,852
Value	$37,989
Colonies of bees	786
Value	$1,636

Principal Crops.

	Acres	Bushels
Corn	100	2,613
Oats	1,032	28,138
Wheat	6,090	84,009
Barley	11,402	177,518
Dry edible beans	10	202
Potatoes	112	13,048

Hay and forage—	Acres	Tons
Timothy alone	40	45
Timothy and clover mixed	265	226
Clover alone	52	102
Alfalfa	8,387	28,332
Other tame and cultivated grasses	258	272
Wild, salt, or prairie grasses	2,184	1,844
Grains cut green	13,157	13,218
Totals	24,343	44,039

Poultry products—	
Poultry raised, number	96,134
Eggs produced, dozens	306,452
Value poultry and eggs produced	$149,168
Honey and wax—	
Honey produced, pounds	15,779
Wax produced, pounds	115
Value of honey and wax produced	$1,198
Wool—	
Wool, fleeces shorn	336,373
Mohair and goat hair, fleeces shorn	36,119
Value wool and mohair produced	$349,689

Special crops—	
Potatoes, acres	112
Sweet potatoes, acres	30
All other vegetables, acres	292

Orchard fruits—	Number bearing trees
Apples	15,633
Apricots	30,446
Cherries	624
Peaches and nectarines	260,204
Pears	41,584
Prunes and plums	92,459
Total	441,070

Tropical fruits—	Number bearing trees
Figs	3,176
Lemons	356
Oranges	10,744
Pomeloes	5
Olives	17,373
Total	31,654

Grapevines—	
Number in bearing	1,307,218
Small fruits—	
Strawberries, acres	36
Blackberries and dewberries, acres	7
All others, acres	6
Total	49

Nuts—	Number bearing trees
Almonds	32,919
Pecans	10
Walnuts	1,569
Total	34,555

Irrigation.

Number of farms irrigated in 1909	366
Acres irrigated in 1909	14,281
Acreage enterprises were capable of irrigating in 1910	23,167
Acreage included in projects	36,020
Main ditches, number	136
Length, miles	164
Laterals, number	41
Length, miles	40
Flowing wells, number	1
Pumped wells, number	141
Cost of irrigation enterprises up to July 1, 1910	$263,055
Average cost per acre irrigation enterprises were capable of irrigating in 1910	11.35

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	400	$2,700
Mineral water, gallons	1,000	500
Stone, miscellaneous	----	750
Other minerals*	----	752
Total	----	$4,702
Number of mineral springs		11

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*Includes chrome and salt.

TRINITY COUNTY.

Date of creation, February 18, 1850.

		1890	1900	1910
Land area, 3,166 square miles.	Population	3,719	4,383	3,301
County seat, Weaverville (township).	Population	768	968	674
Population per square mile, 1.0.				

	Highest	Lowest		Inches		Inches
Elevation, 2,162 feet. 1916: Temperature	107	7	Rainfall	32.06	Snow	63.0

Trinity County is situated in the Coast Range of mountains and is well drained by the Trinity, Mad, Eel, and Van Duzen rivers, and is well watered by the numerous creeks that carry streams of water from the mountain snows to the rivers and their tributaries. The higher mountain ranges, being covered with snow during the winter season, give ample supply for irrigation, and also provide an abundance of pasturage on the mountains. Trinity is bounded on the north by Siskiyou, on the east by Shasta and Tehama, on the south by Mendocino, and on the west by Humboldt County, thus being on the great mineral belt of the northwestern part of the state. Mining for gold has been the principal industry for fifty years. Hydraulic, placer, drift placer, dredge, and quartz mining have produced profitable results. Many other valuable minerals have been found, but owing to the lack of cheap transportation facilities, none of them has been developed to any extent. With an abundance of sugar pine, yellow pine, and fir timber ready for the market, the lumbering interests will be extensive as soon as railroad transportation is provided.

TRINITY COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	6
3 to 9 acres	9
10 to 19 acres	9
20 to 49 acres	24
50 to 99 acres	23
100 to 174 acres	148
175 to 259 acres	23
260 to 499 acres	41
500 to 999 acres	15
1,000 acres and over	10
Total	308
Total in 1900	272

Land and Farm Areas.

Approximate land, acres	2,026,240
Land in farms in 1910	91,310
Land in farms in 1900	76,038
Improved land in farms in 1910	13,300
Improved land in farms in 1900	14,144
Woodland in farms	31,882
Other unimproved land	46,128

Value of all Farm Property.

Total value in 1910	$1,591,469
Total value in 1900	1,040,819
Per cent increase 1900-1910	52.9
Land in 1910	900,855
Land in 1900	583,450
Buildings in 1910	274,260
Buildings in 1900	171,550
Implements and machinery in 1910	69,119
Implements and machinery in 1900	31,180

Domestic animals, poultry and bees in 1910	$347,235
Domestic animals, poultry and bees in 1900	254,639

Domestic Animals on Farms and Ranges.

Cattle—	
Dairy cows	804
Other cows	5,143
Yearling heifers	1,415
Calves	1,126
Yearling steers and bulls	1,308
Other steers and bulls	2,089
Total	11,885
Value	$211,324
Horses—	
Mature horses	1,150
Yearling colts	117
Spring colts	39
Total	1,306
Value	$90,724
Mules—	
Mature mules	142
Yearling colts	19
Spring colts	7
Total	168
Value	$9,985
Asses and burros—	
Number	8
Value	$670

TRINITY COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges—Continued.

Swine—	
Mature hogs	2,594
Spring pigs	1,457
Total	4,051
Value	$17,281
Sheep—	
Rams, ewes and wethers	2,732
Spring lambs	1,081
Total	3,813
Value	$10,486
Goats—	
Number	845
Value	$1,619
Total value all domestic animals	$342,089
Poultry and bees—	
Poultry of all kinds	7,712
Value	$4,729
Colonies of bees	98
Value	$417

Principal Crops.

	Acres	Bushels
Corn	51	1,833
Oats	150	2,667
Wheat	377	5,274
Barley	39	1,210
Dry edible beans	4	275
Potatoes	143	20,467

Hay and forage—	Acres	Tons
Timothy alone	266	550
Timothy and clover mixed	1,549	2,974
Clover alone	135	251
Alfalfa	1,115	2,632
Other tame and cultivated grasses	33	46
Wild, salt, or prairie grasses	578	690
Grains cut green	1,665	1,765
All other hay and forage	9	21
Total	5,350	8,929

Poultry products—	
Poultry raised, number	10,800
Eggs produced, dozens	31,776
Value poultry and eggs produced	$15,957
Honey and wax—	
Honey produced, pounds	1,005
Wax produced, pounds	15
Value honey and wax produced	$207
Wool—	
Wool, fleeces shorn	2,603
Mohair and goat hair, fleeces shorn	44
Value wool and mohair produced	$1,892

Special crops—	
Potatoes, acres	143
All other vegetables, acres	192

Orchard fruits—	Number bearing trees
Apples	4,272
Apricots	41
Cherries	247
Peaches and nectarines	886
Pears	738
Prunes and plums	1,083
Total	7,313

Tropical fruits—	Number bearing trees
Figs	20
Lemons	2
Total	22

Grapevines—	
Number in bearing	2,842
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	5
All others, acres	5
Total	15

Nuts—	Number bearing trees
Almonds	30
Pecans	1
Walnuts	58
Total	91

Irrigation.

Number of farms irrigated in 1909	201
Acres irrigated in 1909	6,324
Acreage enterprises were capable of irrigating in 1910	7,127
Acreage included in projects	9,513
Main ditches, number	208
Length, miles	228
Laterals, number	41
Length, miles	13
Pumped wells, number	1
Cost of irrigation enterprises up to July 1, 1910	$173,414
Average cost per acre irrigation enterprises were capable of irrigat- in 1910	$24.33

Mineral Production in 1915.

Substance	Amount	Value
Gold		$441,846
Mineral water, gallons	120	360
Platinum, ounces	13	435
Silver		3,470
Stone, miscellaneous		900
Other minerals		52,500
Total		$499,511
Number of mineral springs		4

TULARE COUNTY.

Date of creation, April 20, 1852.

		1890	1900	1910	1915 (estimated)
Land area, 4,856 square miles.	Population--	24,574	18,375	35,440	------
County seat, Visalia (city).	Population--	2,885	3,085	4,550	6,000

Population per square mile, 7.3.

	Highest	Lowest		Inches		Inches
Elevation, 334 feet. 1916: Temperature----	105	21	Rainfall---	12.79	Snow---	T

Tulare County is one of the largest counties of the great San Joaquin Valley, extending from the Sierra Nevada Mountains on the east to the Coast Range on the west, embracing a territory from 75 miles to 100 miles in width. The valley sweeps southward 250 miles to where the Tehachapi Mountains intersect with the Sierra and Coast ranges, forming the line between the so-called northern and southern California.

About one-half of the county is mountainous. Its eastern boundary, commencing at the crest of the Sierras, embraces Mount Whitney, whose hoary head reaches an altitude of 4,504 feet and is the highest summit in the United States. Out of these mountains flow many streams that furnish water to irrigate the level and fertile acres.

Wheat and small grains are grown without irrigation. Tulare County was at one time the banner wheat county, some individuals sowing five, ten, and twenty thousand acres, but farming on that scale is rapidly passing away. Still there are many thousand acres sown to wheat annually.

The principal agricultural products of Tulare County are wheat, barley, alfalfa, sugar beets, and Egyptian corn. The sugar beet factory at Visalia harvested 1,640 acres of beets in 1914, producing 8,536 tons of beets and 2,112,100 pounds of sugar.

Tulare County produces large quantities of peaches and prunes, also pears, apricots, apples, olives, figs, plums, almonds, walnuts, raisins, table and wine grapes, oranges, lemons, and berries of all kinds. The citrus orchards in the districts around Exeter, Tulare, Porterville, and Lindsay are the largest and most successful in northern California. The price received for navels in 1916 was 8 cents a box higher than the previous year. The planting of citrus fruits was small in 1916, and there was a heavy loss of fruit on account of the freeze.

Some of the largest raisin vineyards are to be found in Tulare County. The Muscat, Sultana, and Thompson's Seedless are the principal varieties grown. In the vicinity of Dinuba, Orosi, and Sultana this industry is especially flourishing.

About 50 miles northeast of Visalia lies the Sequoia National Park, a reservation by the government of the largest forest of *Sequoia gigantea* trees in existence. The reservation contains about 250 square miles. There are more than 3,000 sequoias in this forest that measure over 45 feet in circumstances and 300 feet in height. The General Sherman in this forest is said to be the largest living tree in the United States. Over 100 feet from its base it is 80 feet in circumference.

NOTE.—In 1899, 96 square miles were transferred to Kings County.

TULARE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	9
3 to 9 acres	171
10 to 19 acres	390
20 to 49 acres	1,247
50 to 99 acres	647
100 to 174 acres	597
175 to 259 acres	198
260 to 499 acres	364
500 to 999 acres	197
1,000 acres and over	201
Total	4,021
Total in 1900	2,212

Land and Farm Areas.

Approximate land, acres	3,107,840
Land in farms in 1910	1,045,231
Land in farms in 1900	1,059,727
Improved land in farms in 1910	507,024
Improved land in farms in 1900	546,289
Woodland in farms	161,360
Other unimproved land	376,847

Value of all Farm Property.

Total value in 1910	$76,539,642
Total value in 1900	20,287,801
Per cent increase 1900-1910	277.3
Land in 1910	$64,455,554
Land in 1900	15,898,600
Buildings in 1910	4,195,452
Buildings in 1900	1,376,960
Implements and machinery in 1910	1,805,419
Implements and machinery in 1900	715,450
Domestic animals, poultry, and bees in 1910	6,083,217
Domestic animals, poultry, and bees in 1900	2,296,791

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	26,765
Other cows	29,478
Yearling heifers	11,911
Calves	16,092
Yearling steers and bulls	8,784
Other steers and bulls	10,429
Total	104,484
Value	*$2,713,596
Horses*—	
Mature horses	18,917
Yearling colts	2,003
Spring colts	1,250
Total	22,200
Value	*$2,334,909
Mules—	
Mature mules	3,149
Yearling colts	288
Spring colts	218
Total	3,655
Value	$491,410
Asses and burros—	
Number	103
Value	$20,534
Swine—	
Mature hogs	23,942
Spring pigs	14,250
Total	38,192
Value	$301,227
Sheep—	
Rams, ewes, and wethers	14,014
Spring lambs	7,170
Total	21,184
Value	$79,930
Goats—	
Number	297
Value	$8,632
Total value all domestic animals	$5,950,238
Poultry and bees—	
Poultry of all kinds	191,965
Value	$102,352
Colonies of bees	9,568
Value	$30,627

Principal Crops.

	Acres	Bushels
Corn	2,527	61,757
Oats	1,281	25,524
Wheat	66,567	761,459
Barley	27,017	553,481
Kafir corn and milo maize	10,987	288,382
Dry edible beans	21	267
Potatoes	677	57,026

Hay and forage—	Acres	Tons
Timothy and clover mixed	35	23
Clover alone	100	250
Alfalfa	37,656	126,316
Other tame and cultivated grasses	546	537
Wild, salt, or prairie grasses	7,158	6,612
Grains cut green	44,822	52,032
All other hay and forage	1,278	3,040
Totals	91,595	188,810

Poultry products—	
Poultry raised, number	204,167
Eggs produced, dozen	1,033,110
Value poultry and eggs produced	$325,658
Honey and wax—	
Honey produced, pounds	290,435
Wax produced, pounds	4,743
Value honey and wax produced	$17,434
Wool—	
Wool, fleeces shorn	33,150
Mohair and goat hair, fleeces shorn	510
Value wool and mohair produced	$35,218
Special crops—	
Potatoes, acres	677
Sweet potatoes, acres	46
All other vegetables, acres	2,550
Sugar beets, acres	1,239

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*Includes animals, age and sex not specified.

TULARE COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Orchard fruits—	Number bearing trees
Apples	25,261
Apricots	48,834
Cherries	316
Peaches and nectarines	714,494
Pears	6,483
Prunes and plums	264,337
Total	1,059,830

Tropical fruits—	Number bearing trees
Figs	15,750
Lemons	41,069
Oranges	801,151
Pomeloes	8,114
Olives	5,605
Total	872,657

Grapevines—	
Number in bearing	7,227,491

Small fruits—	
Strawberries, acres	19
Blackberries and dewberries, acres	70
All others, acres	30
Total	119

Nuts—	Number bearing trees
Almonds	1,977
Pecans	26
Walnuts	1,942
Total	3,945

Irrigation.

Number of farms irrigated in 1909	3,048
Acres irrigated in 1909	265,404
Acreage enterprises were capable of irrigating in 1910	337,938
Acreage included in projects	466,735
Main ditches, number	752
Length, miles	1,033
Laterals, number	577
Length, miles	629
Flowing wells, number	79
Pumped wells, number	794
Cost of irrigation enterprises up to July 1, 1910	$5,634,379
Average cost per acre irrigation enterprises were capable of irrigating in 1910	16.67

Mineral Production in 1915.

Substance	Amount	Value
Brick, M	5,520	$33,364
Feldspar, tons	1,800	6,500
Limestone, tons	1,349	1,888
Magnesite, tons	11,574	104,166
Stone, miscellaneous	-----	36,851
Other minerals*	-----	1,830
Total	-----	$184,599
Number of mineral springs		18

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*Includes chrome and silica.

TUOLUMNE COUNTY.

Date of creation, February 18, 1850.

Land area, 2,190 square miles.
County seat, Sonora (city).
Population per square mile, 4.6.

	1890	1900	1910	1915 (estimated)
Population	6,082	11,166	9,979	------
Population	1,441	1,922	2,029	2,029

Elevation, 1,825 feet. 1916: Temperature, Highest 98, Lowest 17. Rainfall, Inches 44.09. Snow, Inches 4.5

Tuolumne County is in central California. The eastern portion extends into the western slope of the Sierra Nevada range. The entire surface is of a rugged character, with many small and fertile valleys and meadows, and sloping hills heavily covered with timber.

The main rivers are the Stanislaus and Tuolumne, tributaries of the San Joaquin. The Tuolumne has its source entirely within the limits of the county, and may be termed the river of a thousand lakelets, although a number of these strictly come under the head of lakes. The main, or principal branch of the river flows through the Hetch Hetchy Valley. The Stanislaus River, to the north, with one of its branches, forms the boundary line of this county and Calaveras.

In many places the soil is well adapted to fruit growing.

Stock raising is controlled mostly by feed—by those who have ranges in the mountains for summer and pasturage in the foothills for winter. In the mountains in certain sections there are meadows upon which grows the finest kind of bunch grass, while upon the hillsides wild oats and timothy afford a splendid feed.

(*Information supplied by the County Surveyor.*)

Tuolumne County is located near the center of the state, due east from San Francisco, a distance of 90 miles in an air line, at an altitude, above sea level, ranging from 300 feet in the west to 12,000 feet in the east, the average altitude in the populated portion of the county being about 2,000 feet.

The famous "Mother Lode" series of gold-bearing veins traverses the western portion of the county for a distance of 23 miles, giving employment to hundreds of men who wrest from its depths more than $1,000,000 annually.

The county is also traversed by a system of ancient river channels, containing gold-bearing gravels, which have been covered and filled up with a deposit of volcanic origin. Notably among these is the Table Mountain Channel, which is, at present, being mined at many different points.

West of the Mother Lode there is quite a copper deposit, which awaits development to demonstrate its commercial value and possibilities.

Three miles northwest of Columbia is an immense deposit of marble, which is being extensively quarried by the Columbia Marble Company. It is one of the largest marble quarries in California, and many of the notable buildings in San Francisco and throughout the state furnish proof of its quality and beauty. The annual output of marble from this quarry is valued at $50,000.

Limestone is also being quarried at Shaws Flat, Browns Flat, and at a point one mile south of Sonora. South of Sonora the limestone is calcined in kilns, and a superior quality of lime is produced. The supply of limestone is practically inexhaustible.

Tuolumne County has also an extensive lumber industry. One company holds 60,000 acres of white pine, sugar pine, fir and cedar, and another holds 42,000 acres of white pine, sugar pine, fir and cedar. Together, they cut annually about 75 million feet. This industry gives employment to about 2,000 men and is one of the principal sources of revenue to the county.

Although the fruit industry is young, its commercial possibilities have been established.

Besides apples other fruits are grown equally as successfully, among them being pears, peaches, grapes, plums, etc.

Vegetable gardens, with almost every known vegetable, are in evidence in every community and commercially have proven a great success.

In Tuolumne County another important industry is that of stock or cattle raising, the cattlemen being among the wealthiest citizens. Here every opportunity and advantage presents itself, there being abundance of range, feed and water. During the winter months the cattle graze in the foothill ranges and in the summer they are driven to the mountains, where they pasture and grow fat in the rich meadows and hillsides of the mountains within the forest reservation. They are shipped direct, by rail, from Sonora to market in carloads.

For irrigation and development of power there is an abundant supply of water, for Tuolumne County embraces the larger portions of the watersheds of the Stanislaus and Tuolumne rivers—the principal tributaries of the San Joaquin River. In fact, it is from this county that the city of San Francisco expects, in the future, to obtain its water supply, and active operations have already begun for that purpose.

The hydroelectric plant of the Sierra and San Francisco Power Company, located here, supplies the electric power for the street car system in San Francisco and many of the mines in this county.

The splendid system of state highways is being extended into this county, the construction work being already completed as far as Sonora, the county seat.

The county has also acquired and turned over to the state the Big Oak Flat scenic route to the Yosemite Valley, and a more interesting trip than one by this route to the Yosemite, can not be had.

TUOLUMNE COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	1
3 to 9 acres	4
10 to 19 acres	15
20 to 49 acres	28
50 to 99 acres	27
100 to 174 acres	105
175 to 259 acres	35
260 to 499 acres	88
500 to 999 acres	43
1,000 acres and over	40
Total	386
Total in 1900	457

Land and Farm Areas.

Approximate land, acres	1,401,600
Land in farms in 1910	193,072
Land in farms in 1900	204,758
Improved land in farms in 1910	36,407
Improved land in farms in 1900	36,461
Woodland in farms	62,215
Other unimproved land	94,450

Value of all Farm Property.

Total value in 1910	$2,942,322
Total value in 1900	2,131,145
Per cent increase 1900-1910	38.1
Land in 1910	1,779,470
Land in 1900	1,284,260
Buildings in 1910	451,955
Buildings in 1900	397,850
Implements and machinery in 1910	114,830
Implements and machinery in 1900	102,070
Domestic animals, poultry and bees in 1910	596,067
Domestic animals, poultry and bees in 1900	316,965

TUOLUMNE COUNTY SUMMARY—Continued.

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	1,773
Other cows	8,415
Yearling heifers	2,040
Calves	2,977
Yearling steers and bulls	1,531
Other steers and bulls	1,223
Total	18,659
Value	*$377,606
Horses—	
Mature horses	2,053
Yearling colts	242
Spring colts	196
Total	2,491
Value	$165,930
Mules—	
Mature mules	76
Yearling colts	7
Spring colts	8
Total	91
Value	$7,055
Asses and burros—	
Number	26
Value	$1,155
Swine—	
Mature hogs	2,590
Spring pigs	1,303
Total	3,893
Value	$21,620
Sheep—	
Rams, ewes and wethers	1,795
Spring lambs	671
Total	2,466
Value	$8,658
Goats—	
Number	1,609
Value	$3,868
Total value all domestic animals	$585,892
Poultry and bees—	
Poultry of all klinds	15,989
Value	$9,114
Colonies of bees	363
Value	$1,061

Principal Crops.

	Acres	Bushels
Corn	7	156
Oats	425	7,447
Wheat	277	5,373
Barley	579	5,055
Dry edible beans	3	61
Potatoes	114	18,808

Hay and forage—	Acres	Tons
Timothy alone	12	18
Timothy and clover mixed	128	152
Clover alone	110	218
Alfalfa	145	475
Other tame and cultivated grasses	251	264
Wild, salt, or prairie grasses	1,740	1,636
Grains cut green	6,224	6,799
All other hay and forage	11	22
Totals	8,624	9,584

Poultry products—	
Poultry raised, number	22,710
Eggs produced, dozen	94,507
Value poultry and eggs produced	$36,457
Honey and wax—	
Honey produced, pounds	12,310
Wax produced, pounds	65
Value of honey and wax produced	$879
Wool—	
Wool, fleeces shorn	1,408
Mohair and goat hair, fleeces shorn	177
Value wool and mohair produced	$996
Special crops—	
Potatoes, acres	114
Sweet potatoes, acres	2
All other vegetables, acres	232

Orchard fruits—	Number bearing trees
Apples	13,544
Apricots	162
Cherries	144
Peaches and nectarines	3,065
Pears	1,056
Prunes and plums	1,404
Total	19,554

Tropical fruits—	Number bearing trees
Figs	237
Lemons	6
Oranges	114
Olives	10
Total	367

Grapevines—	
Number in bearing	95,811
Small fruits—	
Strawberries, acres	5
Blackberries and dewberries, acres	8
All others, acres	6
Total	19

Nuts—	Number bearing trees
Almonds	54
Pecans	1
Walnuts	175
Total	230

---

*Includes animals, age and sex not specified.

Irrigation.

Number of farms irrigated in 1909	157
Acres irrigated in 1909	2,035
Acreage enterprises were capable of irrigating in 1910	2,083
Acreage included in projects	5,958
Main ditches, number	62
Length, miles	153
Laterals, number	11
Length, miles	24
Flowing wells, number	2
Pumped wells, number	4
Cost of irrigation enterprises up to July 1, 1910	$180,474
Average cost per acre irrigation enterprises were capable of irrigating in 1910	86.64

Mineral Production in 1915.

Substance	Amount	Value
Chrome, tons	352	$2,352
Copper, pounds	27,667	4,842
Gold	------	1,058,103
Lead, pounds	1,779	84
Limestone, tons	8,859	11,349
Silver	------	13,480
Stone, miscellaneous	------	1,900
Other minerals*	------	79,328
Total		$1,171,438
Number of mineral springs		1

*Includes dolomite, lime and marble.

VENTURA COUNTY.

Date of creation, March 22, 1872.

		1890	1900	1910	1915 (estimated)
Land area, 1,878 square miles.	Population	10,071	14,367	18,347	------
County seat, Ventura (city).	Population	2,320	2,470	2,945	3,500
Population per square mile, 9.8.					

Ojai Valley (Station):		Highest	Lowest		Inches		Inches
Elevation, 900 feet.	1916: Temperature	105	25	Rainfall	36.25	Snow	0

Of Ventura County's 1,878 square miles, less than one-fourth is under cultivation. Back from the coast in all directions rise rugged mountain ranges, whose hearts are pierced in every direction with canyons and valleys of varying lengths. The entire northern section of the county is mountainous, but between the ranges here and there are to be found little valleys, whose soil is most productive. These two rivers, the Santa Clara and the San Buenaventura, rise in these northern mountains, their sources being separated but a few miles. The Piru River, the Sespe, and the Santa Paula River, each of considerable length from its winding through the mountain gorges and canyons, flow into and form the Santa Clara River, which enters the county on the southeastern border, and flows in a generally western direction straight across to the sea.

The narrow stretch of coast from southern Santa Barbara County, through Ventura County and including the northern portion of Los Angeles County, is the great Lima bean section. The culture of sugar beets supports the Oxnard sugar factory.

(*Information supplied by the Ventura Chamber of Commerce.*)

Ventura County, one of the group of eight of the southernmost counties of the state, lies between Santa Barbara County on the west and Los Angeles County on the east and extends from a 50-mile front on the shores of the Pacific Ocean (Santa Barbara Channel), north to the summit of the Coast Range mountains (Kern County line).

Its southern half is mainly under cultivation. In its northern portion, situated in the foothills of the Coast Range, are many valleys occupied and organized into (four) school districts.

Its principal streams are the Santa Clara River, having its source in the Coast Range and flowing across the county in a western direction and entering the sea about five miles south of the county seat; this is fed by large lateral streams of considerable length, known as the San Francisquito, Casitas, Piru, Sespe and the Santa Paula rivers. The San Buenaventura River, flowing southerly from the foothills, with San Antonio Creek of the Ojai Valley as a feeder, enters the sea at Ventura; also the Cuyama River, with its source and many lateral streams, situated in the northwest quarter of the county, flowing westerly.

Every variety of plant life does well in this county. It produces more Lima beans than any other county in the state; upwards of 15,000 acres are cultivated to sugar beets, supporting the Oxnard sugar factory; the apricot, walnut, lemon and orange are some of the major products of the county.

VENTURA COUNTY SUMMARY.

Number of Farms Classified by Size.

Under 3 acres	13
3 to 9 acres	87
10 to 19 acres	120
20 to 49 acres	199
50 to 99 acres	214
100 to 174 acres	207
175 to 259 acres	142
260 to 499 acres	155
500 to 999 acres	90
1,000 acres and over	66
Total	1,293
Total in 1900	1,269

Land and Farm Areas.

Approximate land, acres	1,201,920
Land in farms in 1910	550,199
Land in farms in 1900	552,359
Improved land in farms in 1910	213,868
Improved land in farms in 1900	174,419
Woodland in farms	56,061
Other unimproved land	280,270

Value of all Farm Property.

Total value in 1910	$48,262,645
Total value in 1900	21,433,487
Per cent increase 1900-1910	125.2
Land in 1910	$41,826,120
Land in 1900	18,549,200
Buildings in 1910	2,365,140
Buildings in 1900	1,491,250
Implements and machinery in 1910	1,112,812
Implements and machinery in 1900	482,270
Domestic animals, poultry and bees in 1910	2,958,573
Domestic animals, poultry and bees in 1900	910,677

Domestic Animals on Farms and Ranges.

Cattle*—	
Dairy cows	2,666
Other cows	5,887
Yearling heifers	2,139
Calves	2,442
Yearling steers and bulls	2,095
Other steers and bulls	10,850
Total	29,929
Value	*$704,498
Horses*—	
Mature horses	9,955
Yearling colts	906
Spring colts	589
Total	11,480
Value	*$1,497,792
Mules—	
Mature mules	2,250
Yearling colts	66
Spring colts	46
Total	2,362
Value	$407,950
Asses and burros—	
Number	60
Value	$10,310
Swine—	
Mature hogs	6,984
Spring pigs	3,514
Total	10,498
Value	$87,633
Sheep—	
Rams, ewes and wethers	16,113
Spring lambs	15,658
Total	31,771
Value	$119,783
Goats—	
Number	621
Value	$1,273
Total value all domestic animals	$2,826,239
Poultry and bees—	
Poultry of all kinds	60,921
Value	$34,216
Colonies of bees	23,714
Value	$98,118

Principal Crops.

	Acres	Bushels
Corn	2,409	58,995
Oats	1,138	27,901
Wheat	2,896	67,366
Barley	10,077	309,682
Dry edible beans	58,744	1,313,156
Potatoes	264	30,124

Hay and forage—	Acres	Tons
Clover alone	30	100
Alfalfa	1,952	6,960
Other tame and cultivated grasses	23	44
Wild, salt, or prairie grasses	20	40
Grains cut green	49,044	70,193
All other hay and forage	477	1,589
Totals	51,546	78,926

Poultry products—	
Poultry raised, number	61,703
Eggs produced, dozen	372,111
Value poultry and eggs produced	$124,710
Honey and wax—	
Honey produced, pounds	1,839,986
Wax produced, pounds	20,918
Value honey and wax produced	$109,785
Wool—	
Wool, fleeces shorn	21,465
Mohair and goat hair, fleeces shorn	400
Value wool and mohair produced	$14,306
Special crops—	
Potatoes, acres	264
Sweet potatoes, acres	10
All other vegetables, acres	588
Sugar beets, acres	14,333

Orchard fruits—	Number bearing trees
Apples	15,179
Apricots	219,836
Cherries	392
Peaches and nectarines	8,943
Pears	2,597
Prunes and plums	12,541
Total	259,682

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*Includes animals, age and sex not specified.

VENTURA COUNTY SUMMARY—Continued.

Principal Crops—Continued.

Tropical fruits—	Number bearing trees
Figs	618
Lemons	95,018
Oranges	131,681
Pomeloes	392
Olives	25,961
Total	253,754

Grapevines—	
Number in bearing	36,398

Small fruits—	
Strawberries, acres	14
Blackberries and dewberries, acres	7
All others, acres	10
Total	31

Nuts—	Number bearing trees
Almonds	12,057
Pecans	301
Walnuts	98,622
Total	110,984

Irrigation.

Number of farms irrigated in 1909	489
Acres irrigated in 1909	25,273
Acreage enterprises were capable of irrigating in 1910	49,407
Acreage included in projects	56,357
Main ditches, number	148
Length, miles	177
Laterals, number	53
Length, miles	87
Flowing wells, number	32
Pumped wells, number	157
Cost of irrigation enterprises up to July 1, 1910	$2,262,205
Average cost per acre irrigation enterprises were capable of irrigating in 1910	$45.79

Mineral Production in 1915.

Substance	Amount	Value
Brick, thousands	200	$2,500
Natural gas, M cubic feet	491,879	29,670
Petroleum, barrels	1,017,220	869,723
Stone, miscellaneous		2,674
Other minerals		200
Total		$904,767
Number of mineral springs		9

INDUSTRIAL ACCIDENT COMMISSION
OF THE
STATE OF CALIFORNIA

REPORT
OF THE
Industrial Accident Commission
OF THE
State of California

From July 1, 1914, to June 30, 1915

COMMISSIONERS:
A. J. PILLSBURY, Chairman.
WILL J. FRENCH HARRIS WEINSTOCK

Address: 525 Market Street
San Francisco

20453

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REPORT OF THE INDUSTRIAL ACCIDENT COMMISSION FROM JULY 1, 1914, TO JUNE 30, 1915.

Hon. Hiram W. Johnson,
Governor of California.

Dear Sir: In compliance with the requirement of section 88 of the Workmen's Compensation, Insurance and Safety Act, we herewith submit a report of the work of the Industrial Accident Commission for the period, July 1, 1914, to June 30, 1915. This report, in addition to a synopsis of decisions by the Commission under both the laws of 1911 and 1913, contains, for your full information, a recital of the doings of the various departments into which, for convenience and greater efficiency, the Commission has been divided.

Organization of the Commission.

During the year under review the Industrial Accident Commission comprised the following members: A. J. Pillsbury, chairman; Will J. French, vice chairman; Harris Weinstock, member. The various departments were under the supervision of the persons whose names are appended: H. L. White, secretary; J. S. Thomas, assistant secretary; H. H. Kinney, secretary Los Angeles Branch; Chris. M. Bradley, attorney; F. B. Lord, manager Compensation Department; Dr. Morton R. Gibbons, medical director; C. W. Fellows, manager of State Compensation Insurance Fund; John R. Brownell, superintendent of safety; H. M. Wolflin, mines inspector; C. B. Hensley, statistician; G. F. Michelbacher, superintendent of the Permanent Disability Rating Department.

The principal offices of the Commission are located in the Underwood Building, 525 Market street, San Francisco. A branch office, for the convenience of residents of the southern portion of the State, is located in the Union League Building, Los Angeles.

Preference Given Compensation Act.

A feature of the year's progress, and one to which the Commission points with great satisfaction, is the favor which the Act has found with those employers who were exempted from its provisions by section 14, but for whom a method of election is provided by section 87. Inclusive of the date of the closing of the last report, 2,820 employers had filed with the Commission written acceptances of the compensation provisions of the law. During the year here covered, 4,038 additional acceptances were filed, making the total number to June 30, 1915, 6,858. It is not possible to estimate the number of employees who are thus given protection, for the reason that the acceptances do not give specific information, owing, no doubt, to the fact that by far the larger number of acceptances were filed by people engaged in farm, dairy, agricultural, viticultural or horticultural work, or in stock or poultry raising, and the number of their employees varies greatly with the season, reaching a maximum during the harvest.

That the workings of the Act have given general satisfaction to those who have filed acceptances is evidenced by the fact that only four notices of withdrawal have been received, two of which are not yet effective.

Growth.

As indicated by the reports of the various departments of the Commission, the volume of business handled during the year was in excess of expectations. This made necessary an increase in the number of employees, the total of 82 at the beginning of the period having been increased to 138 during the last month.

In addition to the increased number of employees there has been a growing need for additional floor space, both in the main office and the Los Angeles branch. In July, 1914, 9,258 square feet were being used in the Underwood Building, San Francisco. This was increased from time to time until, on June 30, 1915, it reached a total of 12,125 square feet. In Los Angeles the number of square feet used rose from 1,752 at the beginning of the period to 2,683 at its close. Even with these increases there are still some departments which will have to be furnished more room, because of the fact that their present quarters are too small.

That the Act is growing in favor with all classes is evidenced continually in the rooms of the Commission, to which men and women resort for information and to secure, without formal hearing, a proper understanding of their rights and obligations. Attorneys (some of whom were at first inclined to view the law as one infringing their rights) now frequently advise prospective clients that they have no need for the services of lawyers in presenting their cases to the Commission, and some even render assistance without charge. Insurance carriers are rapidly awakening to the fact that the business of dealing with injured persons is now altogether different from what it was under the old liability law, for while, under old conditions, the man who was able to secure the most advantageous settlements for his employer was the one who found favor, at present the man who best understands the law's requirements and who adjusts claims upon their merits without causing unnecessary friction and consequent hearings before the Commission, is in demand. We frequently hear expressions by adjusters who have seen the new light to the effect that while doing business in the old way they often revolted at their work; under present conditions they take pride in it and a proper settlement is always a source of satisfaction. Of course there are still exceptions, but they are growing fewer with the passing of time.

In order that all parties affected by the law may without undue delay and without expense, secure advice as to either their rights or obligations under it, the Commission still maintains a department devoted exclusively to receiving such persons and furnishing needed information. To this department not only injured persons, but employers, lawyers, doctors and compensation insurance adjusters come, individually or together, and often informal hearings are held and settlements reached without the delay which would be necessary in case of formal presentation of the controversies to the Commission. In one month alone the number of visitors to this department reached a total of 482, 196 of whom were injured persons who called for the first time to seek advice. The remaining 286 was made up of representatives of the professions named before, and both employers and employees who had some question regarding their rights to be passed upon. Many cases brought to the attention of this department are amicably adjusted, but a definite statement as to their number can not be given unless we resort to a general statement that all those which do not result in formal hearings are to be counted. This, however, would not be accurate, because some of them were cases of such a serious nature that compensation is still being paid and controversies requiring formal adjudication may arise at any time.

Decisions of the Supreme Court and District Courts of Appeal Prior to July 1, 1915.

Of the nineteen cases in which appeals were prosecuted by writ of review from the decisions of the Industrial Accident Commission to the Supreme Court and the District Courts of Appeal prior to the first day of July, 1915, but five had been finally disposed of by the courts on that date.

In the case of *Joseph Cardoza, petitioner,* vs. *Pillsbury et al.,* 49 Cal. Dec. 33, the Supreme Court denied application for a writ of review on January 5, 1915, on the ground that it was not competent for the court to pass upon the question as to whether or not the findings of the Commission are sustained by the evidence and, further, that the Commission had the right and power to decide finally whether or not the applicant had discovered new evidence material to him. The court held that these were grounds upon which the Commission itself might grant a rehearing under the provisions of section 82 of the Workmen's Compensation, Insurance and Safety Act, but that the courts are restricted to the grounds stated in section 84 of the statute.

In the case of *George W. Smith, petitioner,* vs. *Industrial Accident Commission,* 20 Cal. App. Dec. 284, the District Court of Appeal, Second Appellate District, rendered its decision on February 16, 1915, affirming the award of the Commission in favor of the defendant Southern Pacific Company. The petitioner Smith was a special officer or watchman, employed by the company at its railroad yards at Colton, California. On the night of January 13, 1914, a through passenger train, running from New Orleans to San Francisco and carrying passengers, baggage and express from points without the State destined for points within California, came into the yards. While actually engaged in preventing trespassers from boarding the train as it moved out of the yard, the petitioner was injured by the accidental discharge of the revolver which he carried. The court sustained the Commission by holding that the petitioner was employed in interstate commerce at the time of his injury and was not "an act local in its relation to the business of the employer." In this situation the rights of the parties were held to be governed by the act of congress of April 22, 1908, known as the Employers' Liability Act (U. S. Comp. Stats., Supp. 1909, p. 1171), which fixes the responsibility of every common carrier towards its employees while engaged in commerce between the several states. The important rules laid down in the decision of the court are to the following effect:

The correctness of the findings of fact (made by the Commission) can not be questioned where there has been presented to the Commission any evidence to support them.

It is a rule that findings of the ultimate facts alone are not only sufficient but are the most proper to be made; and while findings of evidenciary facts are permissible, these will always be controlled by findings of ultimate facts where a conflict is presented between the two.

In the case of *Great Western Power Company, petitioner,* vs. *Pillsbury et al.,* decided by the Supreme Court May 12, 1915, the award of the Industrial Accident Commission in favor of the widow of James Mayfield, a lineman in the employ of the petitioner who lost his life while working with high power wires, was annulled. The court held that the employee was chargeable with wilful misconduct by reason of his deliberate violation of a rule of his employer requiring him to wear rubber gloves while working with hot wire. The court said:

> "It can not be doubted that a workman who violates a reasonable rule made for his own protection from serious bodily injury or death is guilty of misconduct and that where the workman deliberately violates the rule, with knowledge of its existence and of the dangers accompanying its violation, he is guilty of wilful misconduct."

The court laid down the rule again that in any case in which there is a conflict of evidence the finding of the Commission can not be inquired into by a court under a writ of *certiorari,* but reached the conclusion that there was no substantial conflict in the testimony before the Commission; that the question therefore was a question of law for the decision of the court under the writ of *certiorari.*

The fatal accident in this case occurred while the Roseberry Law (Chapter 399, Laws 1911) was in force, but the rights of the parties were determined by the Industrial Accident Commission created by the Workmen's Compensation, Insurance and Safety Act as the successor of the Industrial Accident Board which administered the Roseberry law. The court held the Commission to be a validly constituted body, empowered to apply the Roseberry Act to cases arising before January 1, 1914, and held further in support of the contentions of the Commission that the constitutionality of the Workmen's Compensation, Insurance and Safety Act was not involved and could not be contested in this case.

A dissenting opinion was filed by Chief Justice Angellotti, expressing the opinion that the evidence was sufficient to support the finding of the Commission that the deceased was not chargeable with wilful misconduct.

In the case of *San Francisco Stevedoring Company et al., petitioners,* vs. *Pillsbury et al.,* 49 Cal. Dec. 775, decided June 2, 1915, the Supreme Court affirmed the Commission in holding that it is not without jurisdiction of a proceeding by an employee for compensation for injuries received by him in the course of his employment, nor is the employee estopped from pursuing such proceeding by reason of the fact that prior to the institution thereof he commenced an action for damages on account of the same injuries in the Superior Court wherein judgment was given against him upon his failure to amend his complaint after the demurrer thereto had been sustained, because under the statute the right of the employee to resort, at his option, to an action at law for damages is restricted to cases where the injury was caused by the employer's gross negligence or wilful misconduct of a specified character (section 12 [*b*]) and no allegations of such gross negligence or wilful misconduct were made in the complaint.

The case of *Olson and Mahony S. S. Co.* vs. *Industrial Accident Commission,* S. F. No. 7158, in which the Industrial Accident Commission had made an award to the employee who sustained an injury by falling while attempting to board his ship in the dry dock, was settled and dismissed in the Supreme Court on January 12, 1915, upon the payment of $500.00.

Expenses from July 1, 1914, to June 30, 1915.

Salaries	$92,099 87
Office expense	3,386 70
General expense	6,188 98
Postage	3,257 87
Telephone and telegrams	1,437 56
Express	350 29
Stationery and printing	5,405 19
Rent	9,109 32
Traveling	8,032 80
Library	380 83
Furniture and fixtures	4,206 15
Dodge auto	1,022 86
Metz auto	662 45
	$135,540 87
Unearned salary returned by H. Weinstock	2,190 50
	$133,350 37

COMPENSATION DEPARTMENT.

For some time after the Workmen's Compensation, Insurance and Safety Act went into effect on January 1, 1914, the system for adjudicating cases which came before the Industrial Accident Commission was in a formative stage. The number of cases coming before the Commission was so great that it was a physical impossibility for any commission of three men to decide them unaided. Thus the necessity was evident for a system by which many cases might be settled without formal decision by the Commission.

Since the Commission is an administrative rather than a judicial body, methods could be adopted which a court would have neither the power nor the machinery to use. Hence, where there is a dispute as to compensation, employees are encouraged to bring the matter informally to the Commission (but not to the commissioners), for informal advice as to their rights. The secretary and his assistants then ascertain from both sides the facts, advise the parties of their rights, and a settlement is reached in a large number of cases which, before a court, would require long trials and heavy expense. Only where the parties can not be brought to an agreement is the case formally brought before the Commission.

As shown in our last report, the number of accidents reported and cases filed increased so rapidly, and the work in connection with them grew so great, that at the beginning of the last fiscal year the work was divided. The secretary's office continues to answer all inquiries as to rights of employers and employees, carry on the general correspondence of the Commission, and attend to all matters except the actual adjudication of formal cases.

In order to care for cases after a formal application for adjudication of claims was filed, a new department was formed. The division of the function of the Commission by the Act naturally falls into three parts—compensation, insurance and safety—and the new department was called the Compensation Department.

The duty of this department is the conduct of all formal cases, from the filing of the application to the decision of the case by the Commission. Except in cases which can be heard at the San Francisco or Los Angeles offices, arrangements must be made for hearing the case near where the parties reside, and also for a referee and stenographer to try them. The testimony is then written and, if further evidence is shown to be necessary, such evidence must be obtained. If it appears that certain evidence is needed in order to dispose of a case equitably the parties are instructed to have the witnesses who can furnish that evidence present at the hearing or the Commission compels the attendance of such witnesses on its own initiative. It is the duty of the

Compensation Department carefully to follow each case, ascertain whether all the evidence needed has been taken and, if not, to see that it is obtained. Where expert medical testimony is needed the case is referred to the Medical Department for opinion or examination, as seems necessary. To carry out this work much correspondence and personal consultation is needed besides the actual work of filing and serving papers. The volume of work required is made heavy by the fact that much *ex parte* testimony is used, and such testimony must be served upon all the parties and their consent obtained to its admission into the record and also because upon the Commission itself rests the duty of serving all orders and notices.

To provide the assistance needed by the Commission, compensation experts have been appointed to analyze and digest the evidence, both from a practical and a legal viewpoint, and prepare the cases for the Commissioners by the elimination of unnecessary details. It likewise became evident that the Commissioners themselves could not personally hear all the cases, and to give them time properly to consider and decide cases, and perform their executive duties, they had to be relieved from actually hearing every case. The Commissioners still hear personally as many cases as is possible, but in order to relieve them referees have been appointed to hold a portion of the hearings. As the work of the department increased the personnel of the force was added to. At the beginning of the fiscal year 1914-1915 the department practically consisted of two clerks and about ten stenographers and typists. At the end of the fiscal year the force comprised twenty-five people, as follows:

1. Department head	1
2. Compensation experts and decision writers	6
3. Clerks	4
4. Stenographers and typists	14
Total	25

The number of cases filed during the first six months that the law was in effect averaged fifty-four per month. During the last fiscal year there was a steady increase, the total number filed being 1,151, 23 arising under the Roseberry Act, and 1,128 under the present law—an average of 96 per month. The number is still increasing, although there will be but few more Roseberry cases. A considerable further increase seems probable because of the new amendments passed by the last legislature, which added occupational diseases to the injuries compensable under the Act, and those cases will involve issues difficult of determination and requiring adjudication by the Commission in a much larger percentage of instances than in accident cases. Another factor gradually increasing the number of cases actually before the Commission at any time is the provision of the law giving continuing jurisdiction. A claim is decided and the employee is given compensation, but he may not have recovered, and the matter may be brought up at any time to determine whether the disability has either partially or wholly terminated. Since the jurisdiction of the Commission extends over the period of 245 weeks, the maximum number of these proceedings will not be reached till nearly five years have elapsed.

Since all appeals must be made by means of a petition for a rehearing, and a decision by the Commission on that petition, the settling of those requests makes an additional class of cases to be investigated. However, relatively few rehearings have been asked, especially when the newness of the law is considered, only 57 out of 915 decided cases. Of the 57 rehearings asked, 31 have been appealed to the courts, and of these 8 involved the one issue of the jurisdiction of the Commission in marine cases.

The work of the Compensation Department will probably continue to increase, and the force necessary to execute the work will grow accordingly. The increase is shown by the statistics of filed cases. For six-month periods the average per month for the first period was 54, for the second 87, and the third 105. For the four months since June 30, 1915, the average per month has been 111.

The Statistical Department reports 60,737 accidents in the fiscal year last past. There were filed before the Commission 1,128 cases; in other words, 1.9 per cent of the accidents were brought before the Commission. The statistics show that about 19 per cent of the accidents reported were entitled to a disability indemnity. This would give for the last fiscal year 11,540 accidents in which indemnities were payable. The comparison of the number of such accidents with the number of cases filed under the Workmen's Compensation, Insurance and Safety Act would apparently indicate that 9.7 per cent of the compensable accidents were brought before the Commission, but a further examination shows that such is not the fact. Since the statistics of cases brought before the Commission show that 25 per cent of them are decided against the applicant there would be left only 846 of the 1,128 cases filed which should be regarded as included in the 11,540 accidents where disability indemnities were payable. The conclusion reached would therefore be, that of the compensable accidents only about 7.3 per cent are brought before the Commission for adjudication.

Cases Filed July 1, 1914, to June 30, 1915.

	Law of 1911	Law of 1913	Total
1914—July	1	66	67
August	7	96	103
September	2	96	98
October	6	92	98
November	1	81	82
December	1	78	79
1915—January	0	98	98
February	2	85	87
March	0	120	120
April	0	103	103
May	1	109	110
June	2	104	106
Total cases filed July 1, 1914, to June 30, 1915	23	1,128	1,151

	Law of 1911	Law of 1913	Total
Total cases filed July 1, 1914, to June 30, 1915	23	1,128	1,151
Cases filed January 1, 1914, to June 30, 1914	32	291	323
Total cases filed January 1, 1914, to June 30, 1915	55	1,419	1,474

Average per month, January 1 to June 30, 1914	54
Average per month, July 1 to December 31, 1914	87
Average per month, January 1 to June 30, 1915	105
Average per month, fiscal year 1914–1915	96

Statistics of Cases Filed Under Law of 1911 and Law of 1913 to June 30, 1915.

	Law of 1911	Law of 1913	Total
Cases filed to December 31, 1913	69	----------	69
Cases filed from January 1, 1914, to June 30, 1914	32	291	323
Cases filed from July 1, 1914, to June 30, 1915	23	1,128	1,151
Total cases filed	124	1,419	1,543

During the fiscal year ending June 30, 1915, the Commission decided 939 cases out of 1,269 before it, leaving 325 pending at the close of the year. The pending cases have increased for two reasons: first, all actions involving railroads were postponed pending a decision by the Supreme Court of a test case on the question of interstate commerce; second, death cases involving foreign dependents have had to be held open till evidence was procured from Europe. In 598 cases (64 per cent) compensation was awarded, while in 231 cases (25 per cent) it was denied. In 436 cases the issue was the extent or duration of the partial or permanent disability, and necessarily involved an award in favor of the injured employee, the only question being the amount of the award. Not more than 53 per cent of the decided cases, therefore, have an issue where a decision could be made giving the claimant nothing. Since 25 per cent of the total cases were decided against the employee, we see that in all cases where the issue could be for or against either party, the decisions are about equally divided. Eight per cent of the cases were dismissed after settlement, sometimes before and sometimes after hearing. The percentage is fairly large in this class because the policy of settlement by advising the litigants as to their rights is continued even though a hearing is asked.

Classification as to Decisions of Decided Cases from July 1, 1914, to June 30, 1915.

	Law of 1911	Law of 1913	Total
Awarded compensation	15	583	598—63.6%
Denied compensation	7	224	231—24.5%
Settled and dismissed	2	72	74— 7.9%
Dismissed	0	28	28— 3.2%
Stayed by injunction	0	8	8— .8%
Totals	24	915	939—100%
Cases pending, June 30, 1915	5	325	330
Total cases before Commission	29	1,240	1,269

Classification as to Principal Question Involved of Decided Cases from July 1, 1914, to June 30, 1915.

	Law of 1911	Law of 1913	Total
Extent and duration of disability	15	331	346
Extent of dependency	2	103	105
Whether disability was result of accident	1	105	106
Whether accident was in course of employment	1	46	47
Jurisdiction	1	37	38
Extent of permanent disability	3	110	113
Hernia		36	36
Wilful misconduct		23	23
Intoxication		7	7
Payment of medical bills		33	33
Average annual earnings		6	6
Whether employee or independent contractor		21	21
Lump sum settlement		8	8
Refusal to submit to medical treatment		3	3
Statute of limitation	1	6	7
Federal injunction		12	12
Dismissed		28	28
Cases decided	24	915	939
Cases pending	5	325	330
Total cases before Commission	29	1,240	1,269

When the cases decided are classified with reference to the character of the injured, we find that, during the fiscal year, 174 actions were filed to determine liability for fatal accidents. Awards were made in 136, denied in 36 and in two cases action was stayed by injunction of the

Federal courts because the employer invoked the Federal law limiting liability where a vessel is lost. The money value of the death benefits awarded was $310,898.48, an average of $2,285.29 per case. The contested cases involving permanent disability numbered 162, with awards to the amount of $140,945.51, or an average of $1,136.65 for the 124 cases in which an award was made. The bulk of the claims were for temporary disabilities and the awards were for small sums. Awards or settlements were made in 412 cases, but only 273 of these were final, giving an average of $113.70 for each accident and a total of $31,041.00. Temporary disabilities where, at the time of the hearing, the employee had not recovered from his injury, thus necessitating an indeterminate award, constitute the class where the greatest awards for temporary disability will be found. The average per accident will be greater when the amount for this class can be determined. In the 139 indeterminate awards, $18,220.32 has already been ordered paid, or an average of $131.19 a case.

A grand total of $501,105.31 has been ordered paid to enable employees or their dependents to adjust themselves to new conditions of life, caused by an industrial accident.

Classification as to Injury and Award of Decided Cases, July 1, 1914, to June 30, 1915.

	Temporary			Permanent			Fatal			Grand total
	Law of 1911	Law of 1913	Total	Law of 1911	Law of 1913	Total	Law of 1911	Law of 1913	Total	
Compensation awarded	12	332	344	3	118	121	-----	133	133	598
Compensation denied	2	161	163	2	30	32	2	33	35	230
Cases settled	2	66	68	-----	3	3	-----	3	3	74
Cases dismissed	1	23	24	-----	4	4	-----	1	1	29
Stayed judgment	-----	4	4	-----	2	2	-----	2	2	8
Totals	-----	-----	603	-----	-----	162	-----	-----	174	939

Value of Awards in Decided Cases, from July 1, 1914, to June 30, 1915.

	Law of 1911	Law of 1913	Total
Deaths	---------------	$310,898 48	$310,898 48
Permanent disabilities	$7,283 57	133,661 94	140,945 51
Temporary disabilities	*5,005 38	†26,035 62	31,041 00
Totals	$12,288 95	$470,596 04	$482,884 99

*Plus payment till recovery in 6 cases, $1,595.25 ordered paid.
†Plus payment till recovery in 133 cases, $16,645.07 ordered paid.

Compensation for accidents necessitates much medical testimony, and examination by a physician selected by the Commission has been found to be more satisfactory than by any other method. Medical references by such physicians were made in 209 instances. Many medical examinations are also made by order of the Commission for insurance companies who are the real defendants in a large portion of the claims. Insurance carriers were interested in 640 out of the 939 cases decided.

Miscellaneous Statistics of Cases Decided.

Medical references ordered	209
Rehearings asked	57
Appeals taken	31
Cases involving insurance carriers	640

Distribution as to Locality of Cases Filed, from July 1, 1914, to June 30, 1915.

	Law of 1911	Law of 1913	Total
San Francisco and vicinity	6	529	535
Los Angeles and vicinity	3	312	315
Remainder of State	14	287	301
Totals	23	1,128	1,151

REPORT OF PERMANENT DISABILITY RATING DEPARTMENT.

Organization.

The Permanent Disability Rating Department was organized in July of 1913 to put into practical application a plan for rating permanent disabilities.

Need of a Proper Method of Rating.

A proper method of rating permanent disabilities adds much to the efficiency of a workmen's compensation act, for while the number of such injuries is relatively small as compared to all injuries, the effect of accidents of this character upon the working population is most important.

Permanent disability is responsible for the creation of a class of maimed and crippled workers who suffer a permanent decrease in earning power through loss of a function or a part of the body.

Faults of Previous Rating Schedules.

Permanent disability schedules have been used in connection with many compensation laws in the United States, but most of these schedules are based upon physical loss only, and award varying amounts for injuries enumerated as causing permanent disability. These amounts are paid to all employees who sustain the same kind of injury, irrespective of the employee's age and his occupation, and other factors which we have found in California to be of the utmost importance. A rating at best can only be approximately right; so much for an arm and so much for a leg is so crude that it will work injustice in a very large proportion of cases. The index finger is more valuable to a typesetter or a stenographer than it is to a laborer, and the loss of a leg to a bookkeeper is not so serious a misfortune as it is to a stevedore.

Effect of Age.

A disability in general is more serious the greater the age, for the reason that there is less power of accommodation, and less ability to learn a new occupation in which the injured member will not be so necessary.

Physical Requirement.

The degree of skill required to perform the work of a given occupation has a direct bearing on the requirements imposed upon the serious parts of the worker's body. One occupation may require a great amount of physical use of a particular part of the body or of some particular function; another may require no physical use of this same part of the body, or this same function, and still another occupation may be found where the degree of physical use compared with the physical use required by the first occupation is greatly modified. There are all grades and degrees of physical requirement as far as the work incidental to an occupation requires greater or less use of the various parts of the worker's body.

Rehabilitation Theory.

It was for the purpose of considering all these factors scientifically that the Permanent Disability Rating Department was organized. The theory on which the California scale of compensation for the permanent disability was worked out is almost universally accepted as sound. It is known as the "rehabilitation theory", and assumes that a permanently injured workman either can or can not regain his earning capacity. If he can not he must be pensioned for life. If he can, he must be aided financially during the period of rehabilitation. The period of rehabilitation will vary with the extent of the disability, the age and occupation of the injured person.

Under the California act it has been assumed that an average workman of average age will require 240 weeks, or four and one-half years, in which to rehabilitate himself from a 60 per cent disablement. As an aid to him during this period, the law gives him what he would have earned in three (3) years had he kept on at work at the wages he was receiving at the time of his injury. The payments are made to him at the rate of 65 per cent of his average weekly earnings. Injuries creating a lesser degree of disability will correspondingly require a lesser period of rehabilitation.

When an injury is so serious as to create a disability of 70 per cent or over, it is very rarely that the injured person can rehabilitate himself completely. In order, therefore, to prevent him becoming a charge on public charity it is necessary to pension him for life, the pension to vary with the severity of the disability. A workman who has suffered a total permanent disability is not only prevented from supporting his family, but in addition he is a burden thrown on their shoulders. Consequently 65 per cent of the average weekly earnings are paid for the first 240 weeks to aid the family of the injured man, while the various members are accustoming themselves to their changed circumstances, and a life pension of 40 per cent of the average earnings is paid thereafter.

Legal Requirements.

In conformity with the foregoing theory the Workmen's Compensation, Insurance and Safety Act prescribes that "Loss of both eyes or the sight thereof; loss of both hands or the use thereof; an injury resulting in a practically total paralysis; an injury to the brain resulting in incurable imbecility or insanity" shall be presumed to be total permanent disability and that for all other permanent disabilities the percentage of disability to total disability shall be determined in accordance with the fact.

For all disabilities determined to be under 70 per cent, indemnity is payable on the basis of 65 per cent of the average weekly earnings for each four weeks for each one per cent of disability; for disabilities of 70 per cent or over 65 per cent of the average weekly earnings for 240 weeks and thereafter one per cent of such weekly earnings for each one per cent of disability in excess of 60 per cent to be paid during the remainder of life. (Section 15, subsections *b*-2-5 and *b*-2-9.)

It is also to be noted that the law in specifying the manner in which the percentage of disability to total disability shall be determined, provides that account shall be taken of the nature of the physical injury or disfigurement. the occupation of the injured employee and his age at the time of such injury, but without reference to any injury previously suffered or any permanent injury caused thereby.

Difficulty of Rating Without a Schedule.

If every permanent injury had to be rated by the Industrial Accident Commission upon the fact submitted in each separate case, that body would have its time largely occupied with permanent injuries alone. It would necessitate an investigation in each case involving permanent injury to obtain expert knowledge of the industry, of the industrial processes, of the physical requirements of the occupation, of the human anatomy with the effect of the injury upon it, and of the correlation between the injury, the age, and the occupation, to determine the per cent of disability.

Determinations of the percentages of disability for the various combinations of injuries, ages and occupations can be made in advance as easily as after an injury has occurred. Accordingly it was decided to construct a Schedule of Permanent Disability Ratings which would enable any interested party to determine without difficulty the rating for any case.

The Theory of the Schedule.

The underlying theory of the schedule is that there is a certain standard occupation and age which can be used as a basis in determining the percentages of disabilities caused by various injuries. All other occupations can be rated in accordance with the standard as requiring either a higher or lower rating for a particular injury, dependent upon the specialized use which the occupation required of the lost member or function.

Collection of Data for Building a Schedule.

The first step necessary in the creation of the schedule was the complete investigation of the degree of disability which would result to the standard man from each of some 306 injuries recognized as permanent. The standard man was chosen as that of the ordinary unskilled laborer at the age of 39. Age 39 was taken because statistical records show this age to be the approximate average age of persons injured in California. The discussion involved principally a study of functional loss. The laws of the other states and of foreign countries were studied, and each injury was then assigned to a line in the standard table according to the per cent of disability which would result to the standard man.

Having assigned each injury to a line number, investigators were employed to study the effect of occupation on the disability caused by each of the 306 injuries. Each investigator would take an industry group and study the different occupations incidental to it from the point of view of specialized use of certain parts of the body, both for a comparison of the physical requirements imposed upon the parts of the worker's body with the physical requirements imposed upon the similar parts of the standard man's body and for classifying together those occupations having the same physical requirements.

Employers and employees were interviewed and were asked to tell how much above or below the standard the rating should be for the various injuries for particular occupations. Representatives of labor unions, employers' associations and manufacturers' associations were requested to discuss the effects of the various injuries in the various occupations.

Of the 1,300 original occupations investigated there resulted only 52 occupational classifications or groups, each of which imposed different physical requirements. Having regard to the requirements of the occupations on the various portions of the body as compared with the requirements of the standard occupations, each classification of occupations was assigned to a table, either above or below standard.

It remained to include provision for variations in age from the standard age. This was done by means of an empirical formula well tested by practical application to a series of special problems.

The Practical Efficiency of the Schedule.

The schedule was completed and ready for use on January 1, 1914. Today, when a permanent injury is sustained, it is possible to obtain a rating by consulting the schedule after determining three items: (1) the exact nature of the physical injury or disfigurement, (2) the occupation and (3) the age of the worker at the time of the injury. The schedule is easy to apply and has solved the problem of making settlements without the formality of hearings for the adjustment of claims before the Industrial Accident Commission. It is equitable, and has met with the most general appreciation and approval. For scientific work it has found a wonderful popularity among the parties interested. There are not more than two pages of explanation, and it has been found possible to instruct almost any person in its use in a few moments.

As the ratings given by this department are seldom questioned, it has become customary for insurance carriers and employers to refer all cases to the department for proper rating. The result is the elimination of friction between the employer, or his insurance carrier, and the injured employee.

During the year and one-half that the Workmen's Compensation, Insurance and Safety Act has been in effect, this system of rating permanent disability cases has given general satisfaction. It has been demonstrated that the theory is not only capable of being practicably applied, but that the practical application is even simpler than was at first thought possible, and the Commission is relieved of a great many hearings of controversies which would arise under any other plan of rating permanent disabilities.

Since the rating tables were prepared it has been found necessary to supplement the enumerated occupations by others which have come up from time to time. For this purpose an investigator has been pretty constantly engaged in studying occupations, which were omitted at the time the tables were prepared. It has been found to be a simple matter to assign every new occupation to one of the fifty-two occupational classifications. Some four hundred additional occupations have thus been investigated. Besides making visits to the factory or other places of employment, injured workmen are questioned when they come into the office, and the details of their duties brought out. All this is recorded with the view to incorporating the data into a dictionary of occupational requirement and industrial processes.

This department, co-operating with the Statistical Department, is collecting photographic records of permanent injuries. Selected photos are to be published from time to time in the interests of accident prevention publicity.

In addition to making formal ratings on application, this department is also rating informally, from what data can be secured, all other permanent injuries that are reported to the Commission. Of 1,292 permanent injuries reported to the Statistical Department, 618, or 48 per cent, were formally rated and 674 informally rated. History cards of each permanent injury rated are kept, and the information used for tabulation purposes.

The statistical investigation covers a period of two and a half years, from January 1, 1913, to June 30, 1915, inclusive. Accidents occurring during 1913 were not under the present law, which provides for rating in accordance with the schedule. But for statistical purposes, 447 permanent injuries have been rated as under the schedule. During the first six months of 1915, 113 applications were filed for permanent disability rating for accidents occurring since January 1, 1915. Of this number 104 have been rated, 3 were determined to be not permanent, and 6 are still open at this date.

With the information thus collected over a period of two and a half years, we have much valuable information with which to work and tabulate to improve and extend the workings of schedule rating.

The following table summarizes the results of the statistical investigation. Present value in pension cases is figured in accordance with paragraph 2, subsection *b*, section 33 of the law. Six per cent interest was used in determining present money values in pension cases, but the question of mortality was not considered.

Table of Averages of Ratings and Compensation Costs, 1913, 1914, and January to June, Inclusive, of 1915.

	1913	1914	1915 (first six months)	Total
Total number of cases	447	1,292	104	1,843
Total cases ratable	385	1,107	95	1,587
Average rate of all cases	17.3%	16.4%	18.4%	16.7%
Average rate of ratable cases	21.1%	18.8%	20.1%	19.2%
Total compensation liability	$386,469 53	$1,198,998 74	$73,403 08	$1,658,871 35
Average per case	864 59	932 35	705 80	900 09
Total present value of compensation liability	328,340 64	957,658 01	69,316 61	1,355,315 26
Average per case	734 54	744 68	666 51	735 39

MEDICAL DEPARTMENT.

The fiscal year 1914–1915 has required few changes in the conduct of the medical affairs of the Industrial Accident Commission. The plan described in the report of the Commission for the period of January 1, to June 30, 1914, shows the organization and duties as they now exist. The cost of maintaining the office has remained practically unchanged.

The increase in work incident to the increased time of operation of the Workmen's Compensation, Insurance and Safety Act will soon necessitate the appointment of additional assistance in order to properly expedite business. The Commission and all of its departments has had access to the Medical Department on a variety of medical subjects. It is the duty of the medical office to obtain any information desired, and put it into form available for the Commission. This information is drawn from as many sources as the necessities of the case may require, and is correlated and selected by the medical director with the aim to furnish the best medical knowledge to be had on any given medical subject. The chief method of securing information is through medical referees.

The Commission has obtained the services of ninety physicians, prominent in their several specialties, in different parts of the State. To these it looks for assistance in arriving at a just estimate of the medical aspect of cases. The interest manifested by these men is most gratifying. They are co-operating perfectly with the Commission.

No small part of the success of the law is due to this co-operation. It requires special understanding, interest and study, to develop the necessary point of view for the best attainments.

The Industrial Accident Commission is forming its standard of surgical results required of the medical profession of California, principally upon the opinions of the medical referees. These standards are very high. The effect will be—better surgery throughout the State, diminished permanent disabilities, and decreased indemnities. Mediocre and careless surgical work can no longer pass in industrial accident cases. The Commission is always at hand closely to scrutinize each case.

There are two main functions of medical referees:

First—To examine and report upon cases of accidental injury where application has been made to the Commission for relief. Such examinations are requested of the referees by the Commission and are at the expense of the State.

Second—To examine and report upon cases of accidental injury for an employer, an insurance company, or the injured individual himself. These examinations are elicited through the Medical Department of the Industrial Accident Commission and have a value to those requesting them as well as to the Commission.

It is the effort of the Commission to keep the list of medical referees as small as compatible with dispatch in transacting business, in the belief that by so doing the referees will gain, through their experience in a number of cases and the interest thereby engendered, a comprehensive view of the needs of the Commission and a sympathy which will make their service valuable. It has been found necessary in many cases to make very close studies of the literature on the subjects. In some instances a great mass of medical testimony has been produced, all of which must be properly balanced and correlated with the best known literature on the subjects.

In the last year, the Medical Department has studied and furnished information for the Commission in 267 separate cases, and for the insurance companies in 342 cases, making a total of 609 cases, which have gone through the routine of medical referee examination and comment by the medical director. In the majority of these cases there has been required study of X-ray plates, pathological examinations aside from those involved in the referee findings have been required in many cases, besides numerous letters of inquiry in concurrent investigation.

It occasionally happens that more than one referee examination is required. Difference of opinion and different points of view of physicians must naturally be reconciled.

Several subjects have caused the Commission difficulty because of the "border-line" nature of the ailments presented by the applicants for compensation. Among them are hernia, traumatic neurosis, osteoarthritis, flat foot, malaria and muscular rheumatism. The Commission has gradually developed a line of action in these cases and shortly, it is believed, will have established sufficient precedents for easy guidance.

Since the State Compensation Insurance Fund has become the casualty company doing the largest business in California, the work of the Medical Department has increased many fold. The more serious cases are supervised, as far as the occasion requires, through the office of the medical director. All of the bills incurred for medical expenses are scrutinized and modified, or approved in the medical office.

It seems probable that the interests of the fund, and of the injured people coming under its care, will be enhanced by the appointment of a traveling medical inspector. Plans for the establishment of such an inspector are now under way.

It has been found by bitter experience that all physicians qualified by the laws of the State to practice surgery are not necessarily surgeons. It is hoped that a traveling inspector, who shall be a man of good surgical knowledge, will enable the fund to keep accurate track of the progress of its cases and of the character of services which the individual is getting. Such a medical inspector will check up on the work of the hospital and doctor, and upon the interpretation of X-ray pictures and other findings. He will be able greatly to diminish the abuse, now frequent, of over-stay in hospitals, with the consequent overcharge against the State Compensation Insurance Fund.

In the matter of bill adjustment the Medical Department seems to have been generally accepted as the final court. In the last year 214 separate cases for adjustment have come before the department. In a large proportion of these cases (the exact number can not be estimated) the Commission has been saved the expense of a hearing to arrive at just compensation for a doctor or a hospital. Since one of the legitimate functions of the Commission is to adjust such claims, and since the report of the medical director is practically always accepted as final in these cases, it may be seen that the Commission has been saved many hearings.

Other commissions of the State have availed themselves of this function of the Medical Department. The State Board of Control now insists upon approval by the medical director of the medical bills for services to injured employees of the State.

A mass of correspondence is constantly before the medical office, requesting information in every phase of accident, injury and sickness where it bears upon, or approximately bears upon, the law. This work does not show on the surface, yet it requires accurate attention and research, since upon the information thus produced depend many cases of great moment to working people.

The Commission is gathering an X-ray museum, in which, from present indications, there will shortly be a complete series of examples of all bone injuries. This, with the mass of literature accompanying the cases involved, will eventually be of inestimable value for research, for treatment and for decisions of the Commission. All cases are indexed carefully so that cases presenting similar injuries may be quickly referred to and all X-ray plates and pictures found without delay. A medical library of reference and a museum of many interesting specimens procured from accident cases are in process of development.

Throughout the State, the attitude of the medical profession toward the Workmen's Compensation, Insurance and Safety Act, and the Industrial Accident Commission has shown a very noticeable and gratifying improvement. It may be said that understanding and co-operation are now universal. The profession realizes that while the Act is doing good to the working people it also does good to the whole State. It realizes that the medical profession likewise shares in its benefits.

INSURANCE.

REPORT OF STATE COMPENSATION INSURANCE FUND.

Since the date of previous report the State Compensation Insurance Fund has emerged from the period during which it was looked upon by many as an experiment and it has now been demonstrated beyond a doubt that it is possible for the State permanently and economically to conduct an insurance enterprise.

At the close of the first year the ''Fund'' had written $547,161.24 in net compensation insurance premiums, or approximately $144,000.00 in excess of the writings of its nearest competitor.

In order to conserve the interests of policyholders, and protect the ''Fund'' against catastrophe, the management declined risks which presented an element of catastrophe hazard considered beyond the safe carrying of the ''Fund.'' Underground mining risks and seagoing vessels were during the first nine months and until sufficient surplus had been accumulated to provide against possible serious calamity accepted only for limited insurance. While causing some criticism this underwriting judgment was based upon sound business policy and best public interest. To engage in reckless underwriting, like any other lack of economy in the administration of the ''Fund,'' would have been likely to invite disaster and defeat the purpose for which the State Compensation Insurance Fund was created. The method pursued has placed the ''Fund'' on a sound foundation and in a strong financial position.

At the end of the first year the ''Fund'' declared a refund to policyholders amounting to 15 per cent of earned premiums and the refund was allowed as policies expired and actual pay roll expenditures of insured employers were ascertained. The total amount of this refund was approximately $73,000.00. It was freely predicted by competitors that no refund would be possible because of the stringent reserve law which required setting aside for losses 72 per cent of earned premiums, less losses and loss expenses actually paid. This allowed a margin of only 28 per cent to cover acquisition and administration expense and provide a profit to be refunded. The very low operating expense, however, enabled the ''Fund,'' not only to refund 15 per cent, but to maintain a surplus in addition. This showing, based upon statutory reserve requirements, does not fairly indicate the favorable financial condition of the ''Fund'' because the actual losses, including payments made and liberal estimates for outstanding and undetermined cases, were considerably less than the legal reserve requirements. The additional profit indicated by liberally estimating the total cost of each open case is approximately 28 per cent or a total profit of 43 per cent.

At the end of the first year the rate schedule was readjusted, resulting in an average reduction of 10 per cent. By this time the merit system of rating had also been applied to all manufacturing risks and this resulted in a further average reduction. The "Fund" continued to co-operate with the company members of the Workmen's Compensation Service Bureau in the matter of initial rates, believing these rates to be little, if any, higher than necessary under the corporate form of insurance but providing an extra measure of safety for the "Fund" because of its low operating cost. This course was considered just in view of the provision of the "Fund's" policy for return of the profit to the policyholders.

The "Fund" was able to maintain standard rates despite its competition with many other insurance carriers and with several which were writing business at material cuts under such rates. Much reckless underwriting was engaged in by some carriers and, because of the substitution provision of the Workmen's Compensation, Insurance and Safety Act, the beneficiaries under the law were seriously endangered by the threatened insolvency of one or more of the carriers. The legislature of 1915 recognized this danger and passed a law which provides that no compensation insurance may be written at rates less than those previously approved by the State Insurance Commissioner as adequate for all insurance carriers. As this report goes to print an ample justification for this legislation is seen in the recent failure of one corporate company which had written a considerable volume of business in California.

It is recognized that there is still room for improvement in the laws for regulation of insurance carriers writing compensation insurance. Everything possible should be done to protect the solvency of such carriers as their activities strike at the very heart of our industrial and economic system and, in case of failure, the loss must be largely borne by that class which can least afford to suffer it.

The State Compensation Insurance Fund has conducted a systematic and highly successful safety campaign among those employers holding its policies and the elimination of many hazards has resulted in an appreciable monetary saving in insurance loss as well as averting much pain, suffering and loss of earning power among industrial workers. Employers have been encouraged to engage in safety efforts by reward in the way of rate reductions.

From January 1, 1914, to June 30, 1915, 5,861 cases of accidental injury were reported to the "Fund"; 5,392 of these cases resulted in temporary total disability; 83 resulted in permanent partial disability; and 37 cases resulted in deaths. Of the total cases reported, 349 were rejected as creating no liability on the part of the State Compensation Insurance Fund.

Claims against the "Fund" for disability indemnities, death benefits, medical, surgical and hospital service are paid promptly and adequate measures are taken to protect the "Fund" against malingering and excessive charges for professional service. The Commission believes that the "Fund" has established a reputation for fair and equitable treatment of claimants and that the operation of its claim department has been, on the whole, highly satisfactory to all concerned.

Financial statement of the "Fund" as of June 30, 1915, is reproduced on the following page.

STATE COMPENSATION INSURANCE FUND.

Statement June 30, 1915.

(Covering period January 1, 1914, to June 30, 1915.)

Appropriation, chapter 180, Statutes 1913	$100,000 00		
Premiums written, less premiums returned	928,152 09		
Interest received, due and accrued	24,840 26		
		$1,052,992 35	
Expenses and salaries (other than claim department)	$76,651 62		
Expenses and salaries (claim department)	31,216 34		
Compensation and statutory medical payments	162,488 73		
Statutory reserve for outstanding liabilities	385,796 84		
Unearned premiums	145,041 40		
		801,194 93	
Total surplus			$251,797 42
Less refund allowed policyholders (15% of premiums earned in 1914)			65,866 85
Net surplus			$185,930 57
Appropriation, chapter 180, Statutes 1913	$100,000 00		
Net accumulated surplus (unapportioned)	85,930 57		

The above statement is based on the statutory reserve of $385,796.84 to cover outstanding liabilities. If the indicated amount of such liabilities ($171,920.77 including liberal estimates for all undetermined cases) were used the surplus would be as follows:

Total surplus		$465,673 49
Less refund allowed policyholders (15% of premiums earned in 1914)		65,866 85
Net surplus		$399,806 64
Appropriation, chapter 180, Statutes 1913	$100,000 00	
Net accumulated surplus (unapportioned)	299,806 64	

The increase of $213,876.07 in the net accumulated surplus indicated by the last figures together with interest earnings will be available to provide a catastrophe fund and to pay dividends to policyholders when the reserves have been held the statutory time.

State Compensation Insurance Fund. Statement of Bonds Owned as of June 30, 1915

Name of bonds	Interest, per cent	Par value
City of Corona Street Improvement	5	$33,762 50
City of Hanford Sewer	5	76,000 00
Daly City Water Works	5½	90,000 00
San Anselmo School District	5	19,000 00
Larkspur School District	5	9,000 00
Ceres High School District	5	35,000 00
El Monte Water Bonds	6	26,250 00
Riverbank School District	6	10,000 00
Napa Municipal Improvement (Bridge)	5	25,000 00
North Sacramento School District	5	25,000 00
Town of Orland Water Extension	5	12,000 00
Town of Orland Sewer Extension	5	3,000 00
Sausalito Municipal Improvement	5	30,000 00
Hughson School District	5	10,000 00
Rio Vista Union High School District	5	58,000 00
City of Orange Bridge	5	10,000 00
Benicia School District	5	17,000 00
Hermosa Beach Fire Apparatus	5½	5,000 00
Hermosa Beach City Hall	5½	10,000 00
Palo Alto Subway	5	9,500 00
Wilson School District	6	2,800 00
Oasis School District	6	2,000 00

SAFETY DEPARTMENT.

As the result of "Safety First" Conferences held in the principal cities of California during the fiscal year ending June 30, 1915, there developed a co-operative spirit on the part of employers and employees toward the Department of Safety that has been noteworthy. At these conferences addresses were made by representative employers, employees and delegates from the insurance companies having accident-prevention departments. Pictures were shown of work performed by the Department of Safety. Especially telling were the slides illustrating California workshops and factories "before and after" safeguarding. The use of practical, homemade devices was clearly shown and the fear of some employers that the protection of the workers would be very costly was dispelled.

The Industrial Accident Commission, deeming it wise to obtain the opinions of both employers and employees in the important work of preparing safety orders, decided to organize two general committees, one in San Francisco and the other in Los Angeles, and accordingly asked the California Employers' Federation and the California State Federation of Labor to each appoint three representatives, and also requested the Casualty Underwriters' Association of California to appoint one representative to meet with the superintendent of safety of the Commission and prepare general safety orders to govern industrial operations. As a result, the following committee was appointed in San Francisco:

Representing the California Employers' Federation—

F. H. Abbott (chairman), president Franklin Printing Trades Association, 545 Mission street, San Francisco.

Grant Fee, president Building Trades Employers' Association, 2440 Sixteenth street, San Francisco.

H. J. Ralston, president Ralston Iron Works, Twentieth and Indiana streets, San Francisco.

Representing the California State Federation of Labor—

D. P. Haggerty, president California State Federation of Labor, 1111 Lake street, San Francisco.

Paul Scharrenberg, secretary-treasurer California State Federation of Labor, 525 Market street, San Francisco.

Kenneth McLeod, member of Carpenters' Union No. 483, 3611 Twenty-second street, San Francisco.

Representing the Casualty Underwriters' Association of California—

Walter A. Chowen, resident secretary Frankfort General Insurance Company, 340 Sansome street, San Francisco.

Representing the Industrial Accident Commission—

John R. Brownell (secretary), superintendent of safety, 525 Market street, San Francisco.

In Los Angeles a similar request was made to the Merchants' and Manufacturers' Association, to the Central Labor Council and to the Casualty Underwriters' Association of Southern California. The resulting committee was chosen as follows:

Representing the Merchants' and Manufacturers' Association of Los Angeles—

John Griffin (chairman), Pacific Coast Planing Mill Company, 508 Stimson Building, Los Angeles.
W. T. Bishop, Jr., Bishop & Company, Seventh and Alameda streets, Los Angeles.
Reese Llewellyn, Llewellyn Iron Works, Main and Redondo streets, Los Angeles.

Representing the Central Labor Council—

C. F. Grow, 104 Labor Temple, Sixth and Maple streets, Los Angeles.
J. W. Buzzell, 104 Labor Temple, Sixth and Maple streets, Los Angeles.
L. W. Butler, 202 Labor Temple, Sixth and Maple streets, Los Angeles.

Representing the Casualty Underwriters' Association of Southern California—

H. D. Vandeveer, 325 H. W. Hellman Building, Los Angeles.

Representing the Industrial Accident Commission—

H. L. Boyd (secretary), safety engineer, 423 Union League Building, Los Angeles.

These two committees began their labors in the early part of 1915, and worked in entire harmony in the preparation of a set of tentative general safety orders to be submitted to the Commission. At the end of the fiscal year the work of these two committees was practically concluded, in so far as the general safety orders were concerned, but they continued to serve in an advisory capacity in the selection of subcommittees of employers and employees (with representation from the insurance companies) to plan elevator rules, boiler rules, laundry and engine rules. These subcommittees are now actively engaged in preparing a tentative set of rules in their various lines, to be followed by subcommittees for other industries.

The enthusiasm shown in the cause of industrial safety by the general and subcommittees illustrates the value of having men with practical knowledge prepare safety requirements. The method is new, but its place is permanent. Employers and employees in a given industry are far better qualified to consider the technical questions pertaining to safeguarding than are the members of a busy legislature. One noteworthy result of the committee meetings is that labor and capital can meet on common ground, and the way has been paved for further discussions when social and economic problems arise.

During the year a set of tentative general safety orders were issued. The hazards covered included gears, belts, pulleys, clutches, belt shifters, shafting, set screws, sprockets, flywheels, grinding wheels, ladders, stairways, platforms and runways, swinging doors, passages, keys and keyseats, floor openings, hoistways and conveyors.

Exhibit at the Exposition.

The Panama-Pacific International Exposition invited the Commission to exhibit at the great fair. The invitation was accepted, and a booth erected. Many thousands of visitors have been attracted to the exhibit through the use of an automatic device which shows graphically and accumulatively the number of industrial accidents in the United States during each day.

Inspections of Safety Department.

During the year, the Safety Department made 746 inspections, distributed as follows:

Number of plants		Number of employees affected
158	Lumber and its products	16,463
158	Foodstuffs	8,914
125	Metals and machinery	2,357
75	Laundries, dyeing establishments, etc.	2,618
44	Mercantile	1,441
39	Paper, printing, etc.	1,361
28	Construction	1,528
25	Institutions	2,012
18	Miscellaneous, accidents, mines, etc.	1,260
17	Transportation, railroad, etc.	11,421
17	Power and light	8,261
13	Quarries	1,017
10	Brick, tile, pottery, etc.	792
5	Moving-picture concerns	15,120
5	Municipal water plants	17
3	Textiles, cotton mills, etc.	450
3	Acids, oils, asphalt paving, chemicals, etc.	1,116
2	Explosives	625
1	Tannery	70
746		76,843

In addition to the recommendations made by our safety engineers to correct mechanical exposures, the employers were urged to organize safety committees among their workmen, and it is gratifying to report that many such committees are now actively at work.

Bulletins have been issued, printed on cloth, calling the attention of employees to their responsibility in helping to prevent accidents. These are printed in English, Italian, Russian, Croatian, Spanish, Portuguese and Greek, and have been posted in places of employment throughout the State.

A like bulletin has been issued covering general hazards connected with building construction operations.

Safety to be Taught in California Schools.

There is now being prepared an exhibit to be sent to all the public schools of California, under the auspices of the Extension Department of the University of California. This exhibit contains safety appliances, and it is hoped that it will awaken a lively interest and create a lasting impression in the minds of the pupils in the grammar grades and high schools, to the end that they may not only become more cautious as regards their own safety, but that they will become enthusiastic "boosters for safety" in their homes, and thus interest the working members of their families from a direction which it is impossible to reach in any other way.

Increasing Value of the Safety Museums.

The Safety Museum at 525 Market street, San Francisco, has received a large number of additional exhibits during the year and has become recognized as one of the leading museums of its kind in the country. Several of the large employers of California circularized their employees, inviting them to visit the museum and thus become acquainted with the latest methods of preventing accidents. The Southern Pacific Company generously agreed to place signs in the main railroad depots of California inviting people to call at 525 Market street, San Francisco, in the cause of "Safety First."

A branch safety museum has been opened in the Union League Building at Los Angeles.

General Methods Adopted to Promote Safety.

The Industrial Accident Commission joined the National Safety Council in order that the Department of Safety might be closely associated with the country-wide movement to prevent industrial accidents. The council serves as a clearing house and issues printed matter regularly and is in a position to advise its members whenever new engineering problems arise. The Industrial Accident Commissions of other states are affiliated, as well as engineers and employers all over the United States.

There was organized a San Francisco council of the National Safety Council. The Department of Safety assisted in its organization.

By means of newspaper publicity and public speaking, the people of the State have been advised of the progress of our work and have cordially responded. Visits were made to the universities of California and Stanford so that students in the mechanical departments might be informed of the value of properly guarding machinery and eliminating dangerous practices.

Emphasis has been laid on the importance of employers purchasing machinery properly protected. The adoption of workmen's compensation in many of the states has resulted in manufacturers competing on this new basis of furnishing machinery that is protected.

Report of Mining Department.

During the fiscal year 1914 to 1915 the mine safety work was continued on much the same basis as started during the first six months of 1914. Various mines were visited and suggestions made to increase the safety of surface and underground employees. It was found that the field work could not be cared for by one man so a deputy mine inspector, Mr. G. Chester Brown, was temporarily appointed on March 16, 1915, and civil service examinations were held to secure a list from which to make permanent appointments.

Mine Safety Rules.

Since the Industrial Accident Commission has authority, under the Workmen's Compensation, Insurance and Safety Act, to make rules safeguarding employees in the various industries, it was decided to formulate mine safety rules for the State. To secure reasonable rules, a committee of three mine operators and three practical miners was appointed to meet with the mining engineer of the Commission to formulate the proposed rules. This committee was composed as follows:

Representing California Metal Producers' Association—
A. P. Anderson, Pacific coast manager United States Smelting, Refining and Mining Company.
(G. W. Metcalfe, manager Mammoth Copper Company, alternate to Mr. Anderson.)
N. S. Kelsey, manager Argonaut Mining Company.
Arthur B. Foote, superintendent The North Star Mine.

Representing mine employees—
James Giambruno, secretary Amador County Miners' Union No. 135.
J. C. Williams, secretary Grass Valley Miners' Union No. 90.
A. M. Arandall, secretary Randsburg Miners' Union No. 44.

Representing Industrial Accident Commission—
H. M. Wolflin, mining engineer United States Bureau of Mines.

The mine employees were unable to attend the meetings of the committee, so that most of the work was done by the three operators appointed from the California Metal Producers' Association, assisted by the mining engineer of the Commission. This committee held a number of meetings and drafted tentative mine safety rules which were printed and distributed to those interested in mining, throughout the State. A public hearing was held June 11, 12 and 14, 1915, at which time the proposed mine safety rules were discussed in detail. Many of the sections were not seriously criticized, but a number were referred back to the committee to be redrafted.

Mine Rescue and First Aid Work.

The United States Bureau of Mines mine rescue car No. 5 visited the mines that could be reached in the vicinity of Grass Valley, Jackson, Jamestown and Kennet. It also visited the Schools of Mines at the University of California and Stanford University. While in California, the men on duty on this car completely trained approximately 114 men in first aid work and 64 men in mine rescue work. United States Bureau of Mines mine rescue car No. 2 spent about three weeks in the Randsburg district, where approximately 40 men were trained in first aid and 15 in mine rescue work. First aid training in the field was continued by Mr. A. A. Krogdahl, first aid miner of the United States Bureau of Mines, until January, 1915. He visited 21 mines, instructing 266 men in first aid work. Mr. G. Chester Brown, deputy mine inspector, also trained 26 men in first aid work.

Inspections.

During the year, the mining engineer visited 35 mines and made about 304 suggestions affecting the safety of approximately 2,292 men (1,498 underground and 794 surface). Most of his time during the latter half of the fiscal year was employed in connection with the formulation of the mine safety rules. The deputy mine inspector visited 14 mines and made 179 suggestions, affecting the safety of approximately 1,475 men (1,138 underground and 337 surface). In addition to these inspections, 4 mines and 8 dredges were visited by engineers from the safety department and a number of suggestions made. The suggestions proposed by the field men for the safeguarding of mines and protection of employees have, on the whole, received the hearty co-operation of mine operators and employees, and in most cases immediate action has been taken to remedy the hazardous conditions.

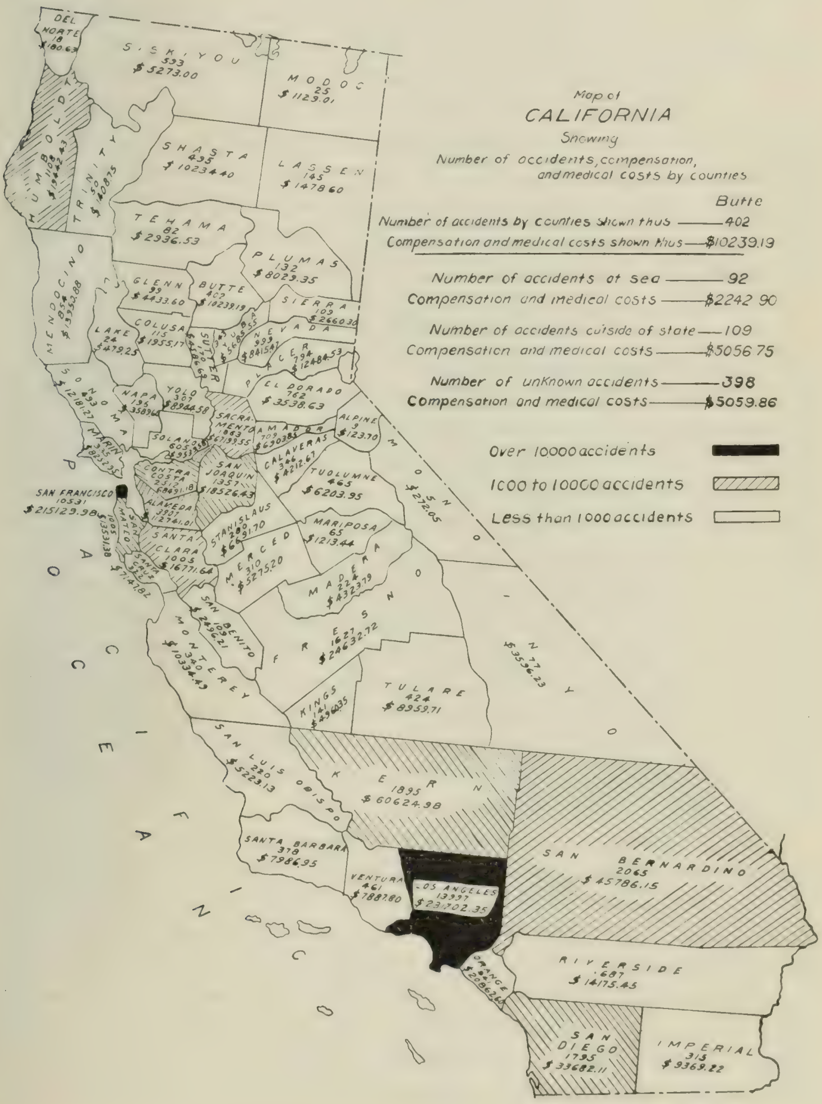
Miscellaneous.

Considerable time of the mining engineer was consumed in overseeing the construction and operation of a full-sized working model of a mine which was exhibited under the auspices of the United States Bureau of Mines at the Panama-Pacific International Exposition.

Arrangements were partially completed for holding a state and national mine rescue and first aid contest in San Francisco in September, 1915.

Summary.

Perhaps 80 per cent of the work necessary for the putting into effect of the mine safety rules was done. The field employees of the Mining Department have inspected 49 mines and dredges and made suggestions affecting the safety of approximately 3,767 men. A complete course of mine rescue training was given 79 men. First aid training was carefully imparted to 446 men.



STATISTICAL REPORT.

Time Covered by This Report.

This report covers a period of eighteen months, beginning January 1, 1914, and ending June 30, 1915. For convenience, the study has been divided into three large divisions with some minor subdivisions. Emphasis has been laid upon the 1914 material which has been analyzed and reduced to charts and tables. The experience for the first six months of 1915 has been generalized only, and a brief statement has been made of the experience for the fiscal year beginning July 1, 1914, and ending June 30, 1915. The first six months' experience of 1915 will be republished in a later bulletin which will cover the work of the entire year of 1915 with complete analyses and charts.

It seems best that the accident experience in this State should be tabulated by calendar years rather than by fiscal years so that a common basis of comparison may be had with other states and bureaus who are preserving their statistical data in this manner.

A New System of Handling Material.

The work of tabulation has in previous years been done by hand, and as a consequence, errors in calculation were not infrequent. When the law was amended to include all accidents which disable through the day of injury or which require expenditure for medical aid, the volume of data regarding industrial accidents was so greatly increased that all hand-methods of tabulation became obsolete and it seemed the part of wisdom to make provision for a more rapid handling of the material. This was accomplished by the aid of the Hollerith tabulating machine. If the limited experience which we have already had with this machine may be taken as a guide, it is reasonable to hope that quarterly reports may be issued within the near future, thus bringing our information of the actual conditions closer to the time when the accidents happened. The value of this is apparent when we consider that the 1914 report could not be published until eight or nine months after the close of the calendar year in which the accidents occurred.

There are several other minor hindrances to a complete report of the year's experience besides the physical limitations of tabulation. First, insurance companies could not make final, complete reports to this Commission until bills were received from the physicians having their patients in charge. Many physicians appear to have overlooked the necessity for making monthly statements to the insurance companies for their services. As a result, insurance companies were not only unable to make complete final reports to this Commission covering the cases in question, but were obliged to expend money for clerical help in order to obtain from physicians bills for their services. On the other hand, this Commission has had to maintain a rather expensive correspondence with the physicians in order to save them from forfeiting their fees under the statute of limitations. Second, it not infrequently happens that employers and physicians in the remote sections of the State are slow in learning that they are obligated under this Act to make reports to this Commission, and as a result, reports are submitted tardily, oftentimes after tabulations are begun, thus causing many changes in the tables and totals, which creates confusion as well as delay.

New Rules and Regulations Regarding the Reporting of Industrial Injuries, Accidents and Occupational Diseases.

The Workmen's Compensation, Insurance and Safety Act as amended in 1915 makes it obligatory upon employers, physicians and surgeons, as well as insurance companies, to report all industrial accidents, injuries and occupational diseases. This amendment is so worded as to make it very clear to every employer of labor in the State that every industrial *injury* must be reported to this Commission, and that no class of labor whatsoever is exempted from this particular provision of the Act. Heretofore, there has seemed to be a general impression on the part of certain employers that because farmers and employers of domestic or casual labor were exempted from liability for compensation to employees injured in such pursuits, such employers were likewise exempted from the reporting of the accidents so occurring. This misunderstanding should be cleared up by the unmistakable wording of section 71(*a*) of the Act as amended in 1915, which states that every employer of labor in this State, without exception, must report to this Commission each and every industrial accident, injury or occupational disease occurring as specified under the provisions of the Act. This also applies to physicians and surgeons as well as to hospitals.

In this connection something should be said regarding the attitude of hospitals in the matter of reporting injuries to their employees. There seems to be a tacit understanding among some hospitals that the nurses in their employ, who receive free medical attention as well as room and board during the time they are disabled, come under the head of domestic labor and that they are, therefore, exempted from the compensation provisions of this Act, and also from the reporting of such injuries to this Commission. Such, however, is not the case.

Duty of Coroners Regarding Reporting Accident Cases.

A word is also in order regarding the reporting of fatalities by the coroner in charge. While no specific mention is made in the Act of the obligation resting upon coroners to report such industrial accidents as come under their jurisdiction, the omission of such definite requirement is due rather to the fact that the coroner is usually a physician and would, therefore, be required to file a report in the capacity of a physician, than to any intention on the part of this Commission to relieve coroners of their part in the reporting of such cases. In other words, the term ''coroner'' is held to be almost synonymous with ''physician'' within the meaning of the Act, and the co-operation of all coroners is earnestly solicited as it is very obvious that they are in a position to furnish full and detailed information regarding the fatalities which come to their notice, including very valuable data in the matter of dependency, which latter item it is many times difficult, if not impossible, to obtain through any other source.

Penalty for Failure to Report.

Failure to report or give intelligence of industrial injuries is, upon conviction, punishable by a fine of not less than ten nor more than one hundred dollars. It should be clearly understood that the announcement of this power to penalize which has been delegated to this Commission by the State Legislature is not in the nature of a threat, but rather as a means of further enlightenment. The Commission has had this power before but has never yet seen fit to make use of it, and it is the sincere desire of the Commission that the occasion to do so will never arise. All that is desired is that this Commission shall have all the information which it is reasonably possible to obtain regarding the industrial injuries, accidents and occupational diseases occurring in this State, in order that an intelligent presentation of the problems arising out of the hazards of industry may be made to the public, and also in order that a basis for a solution of the problems may be arrived at.

In order that the accident experience may be intelligently studied, the form on which the data is submitted must be standardized and some rules and regulations are absolutely necessary for the successful carrying on of the work. Such report forms have, therefore, been adopted and such rules governing the reporting of injuries have been made, as in the judgment of this Commission are best adapted to facilitate the work in hand.

What Physicians Employed by Companies Owning Hospitals Should Report.

The question is often raised by physicians in the employ of large companies who maintain their own hospitals as to where to draw the line in reporting an injury which does not disable through the day of injury and for which no specific medical charge is made. A safe guide in this matter is to determine, first, if the injury is of such a serious nature as to properly require skilled attention; if so, the case is reportable. Second, if the injury does not require any medical attention whatever, but disables the party through the day of injury, the case becomes reportable. In other words, injuries which can be properly relieved by mere emergency treatment, administered by an unskilled attendant, and which do not disable the party through the day of injury, need not be reported to this Commission.

Time for Filing of Reports.

The rules and regulations heretofore formulated by this Commission required that first reports of accidents should be filed by employers within seven days from date of injury; that first reports should be filed by insurance carriers within fourteen days from date of injury; and that physicians' first reports should be filed within ten days from date of injury. Employers' supplemental reports were due thirty days after date of the accident and every sixty days thereafter until disability ceased; insurance companies were not required to file a supplemental report, but their final reports were due fourteen days after termination of disability; no supplemental or final report was required by physicians save in those cases which resulted in permanent disability or in death. These rules have been slightly modified for the convenience of employers and insurance companies who have to file large numbers of reports, and also to facilitate the work in the Statistical Department of this Commission. Employers are now allowed thirty-five days within which to file their first report of injury, which in the great majority of cases may be made complete at time of filing, thus obviating the necessity for a final report; insurance companies are allowed forty-five days for the filing of their first report, by which time it is hoped the majority of the physicians' bills will have been submitted and the history of the case may be made complete; the time for the filing of physicians' reports has not been changed.

Experience in the handling of the data in the Statistical Department during the past year indicates that about eighty out of every one hundred accidents did not cause disability lasting longer than thirteen or fourteen days. This being the case, it was obviously unwise to require employers and insurance carriers to file their first reports within seven and fourteen days, respectively, and the next week or so to file a supplemental report giving only one or two additional items, when by holding up this first report until the history of these minor injuries was complete, the one first report could embody the entire history of the case. This latter plan has been tried out and found to be entirely satisfactory, with the exception of the tardiness on the part of physicians in submitting bills for their services. Insurance carriers oftentimes could make complete report of an accident on the first report with the exception of the payments for physician's services, and inasmuch as physicians often render one bill for their services on the first of each month, it seemed wise to allow the insurance carrier as well as the employer from five to fifteen days after the first of the month within which to obtain statements from physicians, thereby enabling them to close the history of the minor injuries and make complete reports covering the same at one operation. The results obtained so far seem to indicate that this change in the time of filing first reports is for the best.

The information in this report is an index to an industrial condition in this State which is measured yearly in many valuable lives, in millions of dollars and centuries of time.

Because of the wide reach of the interests arising out of these conditions, this report is purposely designed to be, first, educational, and second, if possible, to serve some technical interest. At any rate, it is an earnest of the sincerity of the Commission to determine the problem's magnitude, set it before the public, and apply the remedy. If this is done, the chief end for which this report was conceived will be accomplished.

Limitations of the Material.

This department is aware of the serious limitations of the data for technical purposes, but it is also aware of the value of the information in dissipating doubts about the gravity of the matter. The data shows only one side, and in so doing serves one of the purposes of statistics, that of satisfying curiosity and informing the public mind in a general way of existing conditions. Heretofore it has not been possible to know how many in this State are yearly exposed to the hazards of employments, and without this information the frequency with which workmen thus exposed are injured is impossible to be obtained. There is reason to hope, however, that more definite information in this regard will be available hereafter, at least in a measurable quantity.

Material is Not Without Error.

It may not be at all necessary to admit that beside limitation, the figures compiled herein contain errors of judgment rather than numbers. That much may be a natural assumption. However, without a long discussion of the laboratory methods of how statistics are compiled, something should be said about how errors creep in. Too much emphasis can not be laid on the recognition of this fact in handling large numbers. Statistics can scarcely be absolutely accurate. They can be relied upon as approximations or safe guides, but not as verities. Admission of this shortcoming does not destroy their value, but rather puts them in their proper relation. This does not mean that the numbers or totals of the matter described need not always balance. That much must be true, but the totals do not always indicate the absolute condition. One case in point will be sufficient. One individual or group of individuals, for instance, will classify, or group, industries by their peculiar hazards rather than in their conventional order. A grocery store with a large delivery department and a small clerical force would, in some instances, be classed under the industry group of "transportation" rather than "mercantile." In a similar manner, occupations and causes, etc., may be confused where masses of material need to be handled by a number of individuals. There is scarcely a conceivable way in which the personal equation can be eliminated and the error standardized. In spite of this, however, the outlines of any problem can be clearly shown by assembling in logical order all possible information relative to it. It is hoped that the foregoing remarks will, for their frankness, if nothing else, induce in the reader a sympathy which will provoke a careful survey of the material which follows.

Explanation of Titles of Industries Which are Used in This Report.

The Commission, realizing the need of standardizing its statistical data so that comparison with the experience of other states and bureaus may be practicable, has attempted to classify as much of the material as possible in agreement with definite plans in use in other states. These standards recognize eight principal causes of accidents and about as many industries. These main groups are variously subdivided so that all groups, main or subgroups, will be mutually exclusive. These classifications of industries may require some explanation. For instance, in this report the word "Extraction" was used for the sake of brevity, to indicate all operations in the extraction of mineral products from the earth, including oil and quarrying. Also, under the head of "Service" will be found all classes of industry or specialized occupations where no commodities are manufactured or dispensed. A service only was rendered, skilled or otherwise, profitable or pleasurable. The term "Trades" does not allude to a vocation or craft, but is used in the sense of trafficking in commodities, wholesale or retail, which commodities were manufactured by a distinct group of workmen engaged in manufacturing. "Transportation" refers to all modes of transit of passengers and freight. Also included under this head are utilities of a public nature, though ownership may be private. Thus, by these classifications, industry and labor are divided into very natural industrial groups, as follows:

(1) Those who produce, by cultivation and husbandry, our raw products—*Agriculture.*

(2) Those who recover for us natural products from the earth—*Mining, extraction.*

(3) Those who fashion and prepare these products thus procured—*Manufacturing.*

(4) Those who construct convenient places of shelter for the carrying on of the great businesses of industry, etc., the builders—*Construction.*

(5) Those whose business it is to prepare transportation facilities for commerce—*Transportation.*

(6) Those who market for us—*Mercantile Trades.*

(7) Those who qualify themselves to render the very highest of technical service as well as those who amuse and entertain—*Service.*

(8) Occasionally some business appears which defies classification and, for convenience, it is placed under the head of—*Miscellaneous.*

Such classifications, if rigidly followed, will oftentimes compel a disregard of the factor of hazard.

STATEMENT OF LIABILITY AND DISBURSEMENTS.

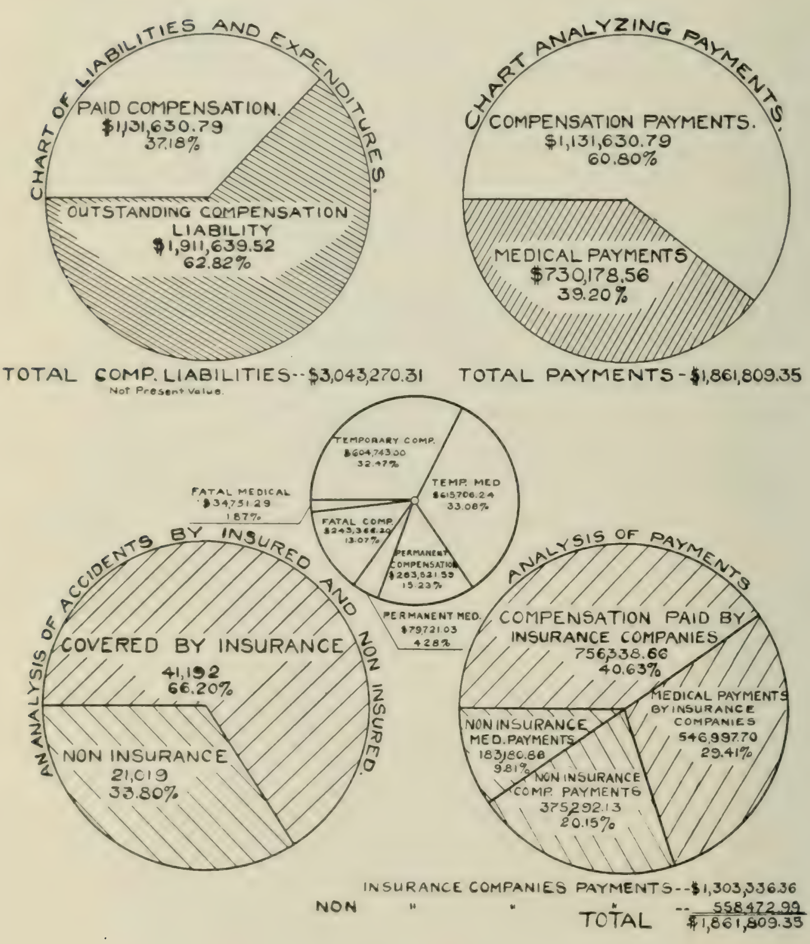
Time: 12 months—January 1 to December 31, 1914.

Total payments of compensation and medical benefits		$1,861,809 35
(1) 678 fatal accidents, amount reported paid to date	$278,117 49	
(2) 1,292 permanent injuries (including 31 pensions), amount reported paid to date	363,242 62	
(3) 60,241 temporary injuries, amount reported paid to date	1,220,449 24	
Total payments for medical, surgical and burial benefits		730,178 56
(1) 678 fatal accidents	$34,751 29	
(2) 1,292 permanent injuries	79,721 03	
(3) 60,241 temporary injuries	615,706 24	
Total compensation paid		1,131,630 79
(1) 678 fatal accidents	$243,366 20	
(2) 1,292 permanent injuries, including 31 pensions	283,521 59	
(3) 60,241 temporary injuries	604,743 00	
Total liability for compensation for all accidents in 1914 (liability for medical services not included) amounted to		3,043,270 31
Estimated compensation liability for all fatal accidents in 1914 (present money values not considered)	778,480 88	
Estimated compensation liability for all permanent injuries, excluding 31 pension cases in 1914 (present money values not considered)	872,191 64	
Estimated compensation liability for 31 pension cases in 1914 (present money values not considered)	326,897 10	
Estimated compensation liability for 12,737 compensable accidents of temporary nature in 1914	1,000,000 00	

NOTE.—No estimate of the outstanding liability for medical services is available.

62,211 INDUSTRIAL ACCIDENTS.

1914.



A STUDY

OF

SIX HUNDRED AND SEVENTY-EIGHT FATAL ACCIDENTS

1914

SIXTY-TWO THOUSAND TWO HUNDRED AND ELEVEN INDUSTRIAL ACCIDENTS IN 1914.

678 Fatal Accidents, 1,292 Accidents Resulting in Permanent Injuries, 60,241 Accidents Causing Temporary Disability.

The statistical data published in the last report of this Commission only covered the first six months' experience of 1914. The full 1914 year's experience is covered in this report, including a complete retabulation of the first six months' data, with many additional studies.

Sixty-two thousand six hundred and sixty-six (62,666) industrial accidents were reported to this Commission during the first year of the operation of the Act (1914). Four hundred and fifty-five (455) cases of this number are not given further mention in this report as they do not bear sufficient evidence to class them as industrial or even bona fide accidents.

The 62,211 bona fide accidents include 1,292 schedule permanent injuries, and 678 cases of fatal accidents. The remaining 60,241 accidents resulted in temporary disability. Already employers and insurance companies have paid $1,861,809.35 to relieve and compensate the injuries resulting from the year's accidents.

Summary of Accidents.

Of this $1,861,809.35, nearly three-quarters of a million ($720,178.56) went to the doctors, druggists and undertakers, and more than 40,000 strong men lay in the hospitals or under the doctor's care for periods averaging two weeks or more time. With the exception of Sundays and holidays, two of California's workmen may prepare every morning to have some one return them to their homes for burial. About twice this number must make application each day to the surgeon for the elimination of some portion of their bodies which can no longer serve them, while a strong contingent of men surrender themselves every day to an efficient Red Cross. Such figures as these read very much like a dispatch from the front, and reference to the number and nature of injuries inflicted will reveal a more striking similarity. Not a few die of poisonous gas, and many suffer shocks which completely shatter their nervous systems.

Plan for Peace.

There is one dissimilar feature of this report compared with one from the front. Peace and safety are discussed daily by industry's diplomatists, but they all agree that it will neither come instantaneously nor very soon. They do agree that when these results are achieved in any large measure, it will be through the medium of a vigorous and extended campaign of educational, industrial safety, and not through the proclamation of any one individual class or order. The type of education is not that of a college course in industrial ethics, but information, facts and figures of the actual magnitude of the problem, the underlying causes, and their disastrous results to every one.

Study of 678 Fatal Accidents.

Last year, 1914, nearly half a hundred thousand people died in this State, some from old age, some from disease, and some out of choice. Provision of some sort for all concerned could be discussed, if not provided. In 678 instances, strong healthy workmen, not contemplating death, were suddenly cut off without warning and without time to look after that for which it was thought a lifetime was given. They did it to earn for themselves and for us who enjoy all that civilization and organized industry bring into our lives. When they were killed, they left dependent, either wholly or partially so, seven hundred and thirty-six (736) of their relatives.

Dependency.

The term ''total dependency,'' properly translated, means a widow with children to care for, and who has contributed her share to society. Her youth is gone, and should she care to marry again, she has her family to consider, which very likely would prove a barrier to a very successful future.

Age of Dependents.

Experience in this State shows that the average age of the wife widowed by accident is around 38 years, and that of the child, is about 9 years. Two hundred and forty-one (241) women were widowed thus in 1914 and three hundred and forty-eight (348) children were made half orphans. Thirty-six (36) others were so closely related to those killed, and were in such advanced stages of age or ill health as to be rendered totally dependent by the loss of the deceased's support. Practically the same can be said of one hundred and eleven (111) partial dependents who were made so by accident, but who have pittance but doubtful incomes from boarders, house rental, sale of milk from a cow or two, or a school lad or girl who doesn't go to school any more.

Circumstances of Those Who Were Left Dependent by Accident.

Some readers may think, and perhaps with some justice, that the provinces of statistics are being pushed back too far when personal questions of family circumstances and the disposition of their means are raised, and that such information aside from being untabulatable, can not be relied upon. All of which is granted, and at the same time the results of such inquiries secured from about seventy (70) per cent of the dependents, are submitted, not as being of technical value, but as an item of human interest. Only six and one-half (6½) per cent of the cases investigated can be classed as being in good circumstances, that is, owning some property or possessing adequate incomes. About forty-eight (48) per cent of the cases revealed moderate, (tolerable) conditions, while sixteen (16) per cent were in intolerable circumstances. Destitute is the proper word to use in some of this last-mentioned class. There is no known device which can measure the density of the darkness which engulfs those who *suddenly* sink below the poverty line as their only support is crushed beneath them.

Liability for Fatal Accidents.

There is good reason for laying heavy emphasis on the conditions of squalor and sorrow resulting from preventable and, therefore, absolutely needless causes. The unembellished statement of disaster which was far removed from our vision and which by our count never will come within range of our experience, scarcely provokes a sympathetic thought, and would never, therefore, give birth to action.

There are just about two things which will cause those who are responsible for things, to undertake an act of reform. One of these is the sight or scene of disaster to themselves or their immediate own, and the other is a summons from the court to appear in a damage suit where the liability to draw a check is very great.

If the human side as presented above does not induce serious enough reflection, perhaps a financial statement will help.

It should be remembered that the statement here of liability covers only six hundred and seventy-eight (678) fatal accidents, and does not include the liability for payments to physicians for their services.

Average Death Benefits.

If every dollar in death benefits for the 678 cases was paid, it would amount to about $743,480.88, assuming that money is worth six per cent (6%), or nearly three-quarters of a million dollars for 678 accidents, averaging about eleven hundred dollars ($1,100.00) for each accident. This figure, however, is not the average benefit for a fatal accident where dependents are left. Ordinarily, not more than one hundred dollars is expended or allowed for burial expenses, and where no dependents are left, compensation is not due. As the number of married men killed is a little less than forty per cent (40%) of the total, the average death benefit is about twenty-seven hundred dollars ($2,700.00).

Burial Charges.

Assuming that one hundred dollars ($100.00) was expended in each case for burial expenses, in cases where there were no dependents, the probable total liability for fatal accidents in 1914 was about seven hundred and seventy-eight thousand dollars ($778,480.88). This figure includes burial and compensation liability and is the commuted present value of the total compensation liability which determines the size of the circle on the chart of liabilities and expenditures found in the report. Before the reader concludes that the average benefit is just a trifle exorbitant and wonders how long it will be before the dailies will announce the insolvency of industry, it might be well to be reminded of the average settlement made eight or ten years ago when even corporations and courts couldn't lower the actual settlement below eight thousand dollars ($8,000.00). Even admitting that things on an average have changed for better industrial conditions, it does not argue a ''popular'' triumph, but merely a triumph of reason and justice.

Industries Where Deaths Occur.

It does seem as though some one of the industries ought to be free enough from hazards to allow a workman to enjoy his ''three score and ten.'' History teaches otherwise. From a view of the charts it will be seen that the simplest and oldest of the human being's industries, the farm, is chargeable with killing sixty-two (62) men in twelve months, an average of five (5) men a month.

It is not difficult to think of serious accidents happening in railroad yards where trains are so thick a man has to try to look both ways at once; or on board vessel where heaven can interfere with the winds or waves, or in the mines where earth flakes off at no special time, but out on the open country, it is difficult to understand.

The relative responsibilities of the different industries for fatal accidents are clearly set forth on a chart appended hereto.

COSTS OF FATAL ACCIDENTS BY INDUSTRIES.

The following table will throw a better light on the responsibilities of the different industries by introducing the item of costs:

Liability and Dependency.

Five items of interest of the 678 *fatal* accidents are shown in the opposite chart.

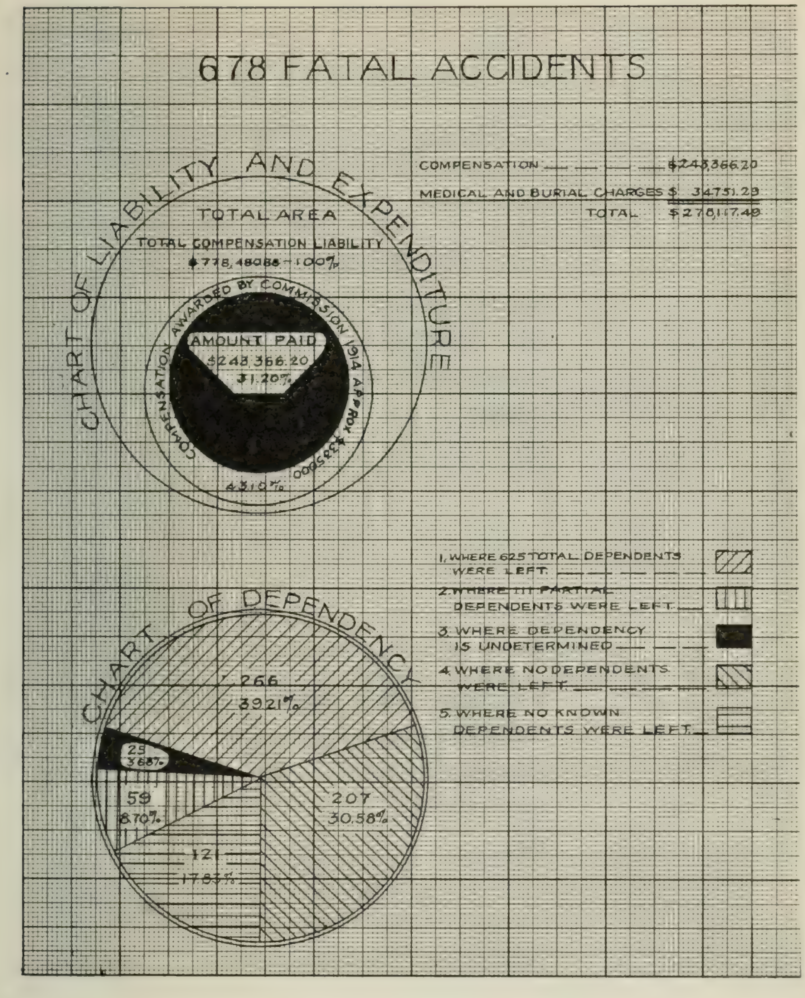
(1) The top large circle represents the total liability of both employers and insurance companies for fatal accidents. About 430 of the fatal accidents were not covered by private or state insurance, if our information be correct.

(2) The two inscribed circles show the approximate amounts of death benefits awarded by the Commission, and

(3) The amounts of benefits reported as paid.

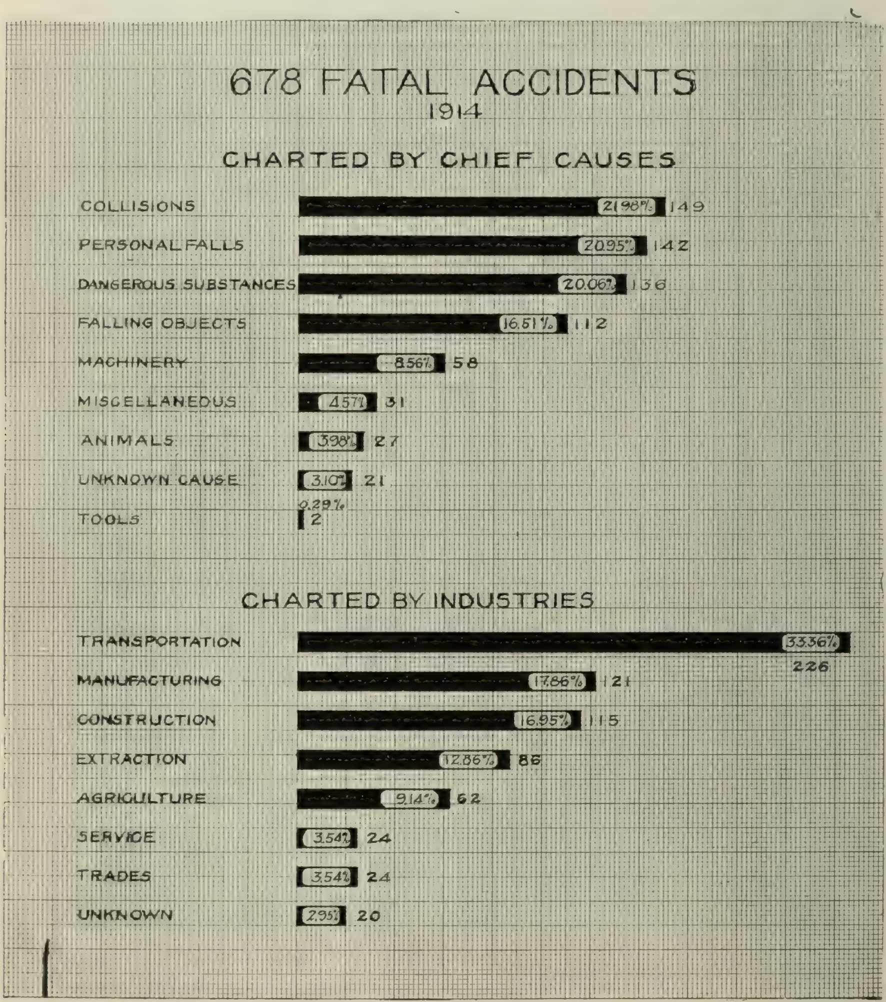
(4) The lower circle is a chart of dependents.

(5) The item of burial and medical costs is also included in this chart.


678 FATAL ACCIDENTS
COMPENSATION $248,366.20
MEDICAL AND BURIAL CHARGES $ 34751.29
TOTAL $278,117.49
CHART OF LIABILITY AND EXPENDITURE
TOTAL AREA
TOTAL COMPENSATION LIABILITY
$778,48088 – 100%
COMPENSATION AWARDED BY COMMISSION 1914 APPROX $335000
43.10%
AMOUNT PAID
$248,366.20
31.20%
CHART OF DEPENDENCY
266
39.21%
25
3.68%
59
8.70%
121
17.83%
207
30.58%
1. WHERE 625 TOTAL DEPENDENTS WERE LEFT
2. WHERE 111 PARTIAL DEPENDENTS WERE LEFT
3. WHERE DEPENDENCY IS UNDETERMINED
4. WHERE NO DEPENDENTS WERE LEFT
5. WHERE NO KNOWN DEPENDENTS WERE LEFT

CAUSE AND INDUSTRY.

Only main causes and main industries are shown on following chart. For detailed study of subcauses and subindustries, see tables, also the classified list of fatal accidents.



678 FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Benefits in Compensation and Burial Rites Distributed by Industries in Which Accidents Occurred.

Industries	Number of cases	Compensation	Medical	Totals
Agriculture	62	$2,472 30	$7,274 20	$9,746 50
Construction	115	60,854 46	7,065 01	67,919 47
Extraction	86	18,926 86	5,153 00	24,079 86
Manufacturing	121	54,915 69	5,547 21	60,462 90
Service	24	7,746 74	804 90	8,551 64
Trades	24	5,709 11	1,523 75	7,232 86
Transportation	226	90,041 04	7,266 57	97,307 61
Unknown	20	2,700 00	116 65	2,816 65
Totals	678	$243,366 20	$34,751 29	$278,117 49

Causes of Fatal Accidents.

The accompanying chart of the chief causes of fatal accidents is very illuminating but may not be considered as absolutely indicative of the relative responsibilities of each main cause. This doubt always arises where only a few figures are available. A chance for variance is so easy.

If taken as it stands here, it is a greater argument for the need of lectures on safety "caution" than safety "prevention." Machinery was responsible for only eight and seven-tenths per cent (8.7%) of the accidents, while personal falls scored second on the list in degrees of responsibility. The doubtful scaffold is not always the cause. It sometimes is the occasion. Phlegmatism is one of the causes. The causes of accidents are many and are part of the very scheme of our social existence. Some of the occasions for accidents are stupidly-built scaffolds and carelessly-designed machinery.

Before listing a few specific cases of fatal accidents with their causes, a word should be said about the attention which this Commission is giving to the study of fatal accidents. About two hundred and twenty-five (225) cases of fatal accidents were submitted to this Commission for adjudication, the accidents occurring in 1914. These cases, therefore, are known in every detail to the Commission. The remaining four hundred and fifty (450) odd cases which did not come before the Commission were investigated to determine as many of the facts as possible. The reason why this needs to be done is that the regular report form, designed for reporting all accidents, does not and can not contain questions to cover every point. These special investigations included inquiries as to the age and relationship of dependents, the degree of dependency, the amount of compensation which had been paid, the use that was being made of the money, and the present circumstances of the family. The degree of dependency was determined, and the indemnity in each case was estimated and commuted to the present money values. Oftentimes a better description of how the accident happened was obtained.

A few of the specific causes of fatal accidents gotten in the above manner, follow. The cases are chosen in no specific order, and attention is called to the striking similarity between their description and the headliners of an "Extra":

"Clothes caught on shaft; beaten to death on floor."

"Came in contact with high tension circuit."

"Caught in belting of rock breaker; pulled around pulley."

"Explosion in mine."

"Explosion caused by drilling in missed hole."

"Crushed by rock falling out of roof."

"Fell from ladder."

"Asphyxiated."

"Inhaled cyanide fumes."

"Struck by falling tree."

"Strap broke, fell from building."

"Burned to death."

"Spilled pot of soup, burned to death."

"Casting rolled off truck, mashed."

"Drowned."

This is the story twice daily on an average, and some of them are so needless. But that feature admitted, does not alter the economic features of the situation by one jot. It is hoped that the above will create an interest in the classified list of fatal accidents appended hereto.

Such items of interest as age and wage and dependency, as well as items of cost for the fatal accidents, have been put into simple charts, not with any desire to be modish, but with the sincere hope that the story will be more successfully told.

678 FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

	Per cent	Number
Machinery	8.61	58
Dangerous substances	20.06	136
Falling objects	16.48	112
Tools	.29	2
Animals	3.98	27
Collisions	21.98	149
Personal falls	20.94	142
All others	4.57	31
Unknown	3.09	21
Total		678

678 FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Amounts Paid in Compensation and Medical Benefits by Chief Causes.

Cause	Compensation	Medical benefits	Totals
Machinery	$30,625 55	$4,354 50	$34,980 05
Dangerous substances	44,213 21	5,880 84	50,094 05
Falling objects	56,154 15	6,531 75	62,685 90
Tools	759 36	69 50	828 86
Animals	294 65	1,968 15	2,262 80
Collisions	51,269 20	5,692 49	56,961 69
Falls	48,291 32	9,144 15	57,435 47
All others	7,431 86	886 91	8,318 77
Unknown	4,326 90	223 00	4,549 90
Totals	$243,366 20	$34,751 29	$278,117 49

AGE.

This chart compares the ages of those permanently injured and those temporarily injured, with those who were fatally hurt. The solid line refers to the fatal cases. It can be read in numbers as well as percentages.

See tables for age groups classified by industries.

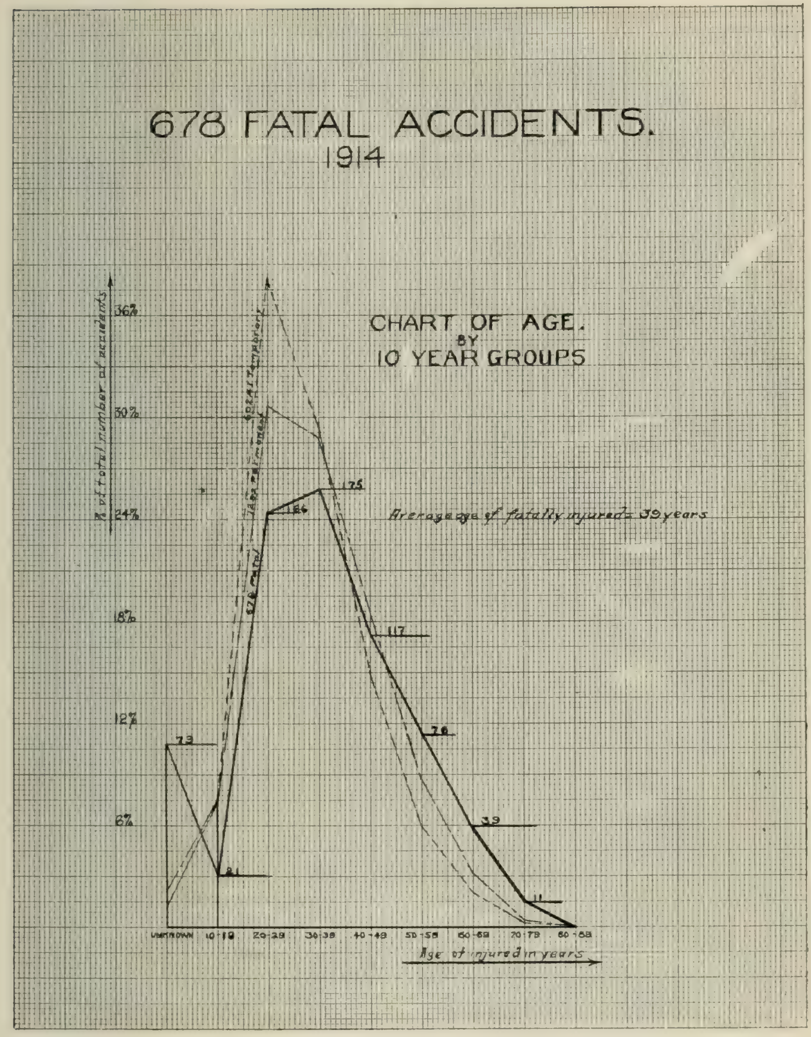
678 FATAL ACCIDENTS.

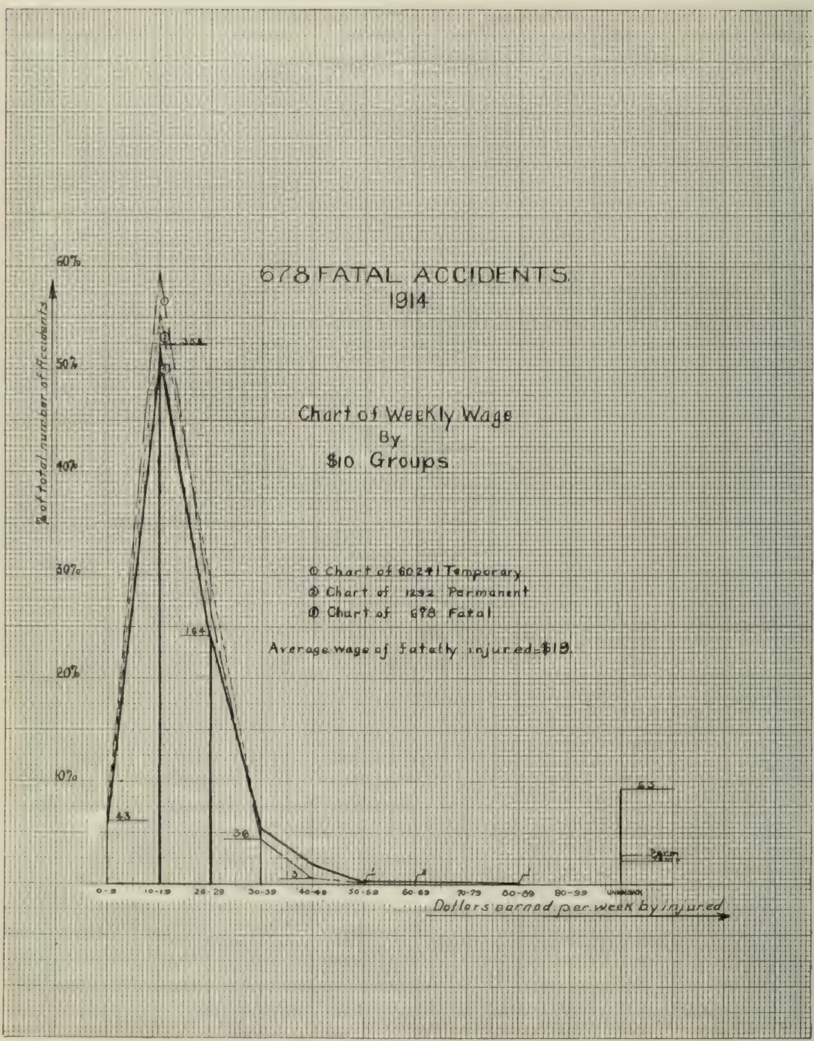
Time: 12 months—January 1 to December 31, 1914.

Cases Grouped in Ten-Year Periods, and the Industries in Which They Occurred.

Age groups	Industries								
	Agriculture	Construction	Extraction	Manufacturing	Service	Trades	Transportation	Unknown	Totals
Under 10									
10 to 19	5	3		5	2	2	3	1	21
20 to 29	19	26	16	31	7	6	62		166
30 to 39	8	34	30	31	7	3	60	2	175
40 to 49	7	29	15	19	1	2	43	1	117
50 to 59	17	11	10	16		6	15	1	76
60 to 69	5	3	4	10	3	2	11	1	39
70 to 79	1	2		2	1	2	3		11
Unknown	1	7	11	7	3	1	29	14	73
Totals	62	115	86	121	24	24	226	20	678

Average age, 39 years.


678 FATAL ACCIDENTS.
1914
CHART OF AGE.
BY
10 YEAR GROUPS
% of total number of accidents
36%
30%
24%
18%
12%
6%
50241 Temporary
1483 Permanent
678 Fatal
73
21
164
175
117
76
39
11
Average age of fatally injured = 39 years
UNKNOWN
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
Age of injured in years


678 FATAL ACCIDENTS
1914
Chart of Weekly Wage
By
$10 Groups
① Chart of 60241 Temporary
② Chart of 1292 Permanent
③ Chart of 678 Fatal
Average wage of fatally injured=$19.
60%
50%
40%
30%
20%
10%
% of total number of Accidents
43
164
30
13
63
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
UNKNOWN
Dollars earned per week by injured

WAGE.

Similar to age chart. Read solid line for *fatal accidents.* For closer analysis, see tables.

678 FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Table by Wage Groups and Industries.

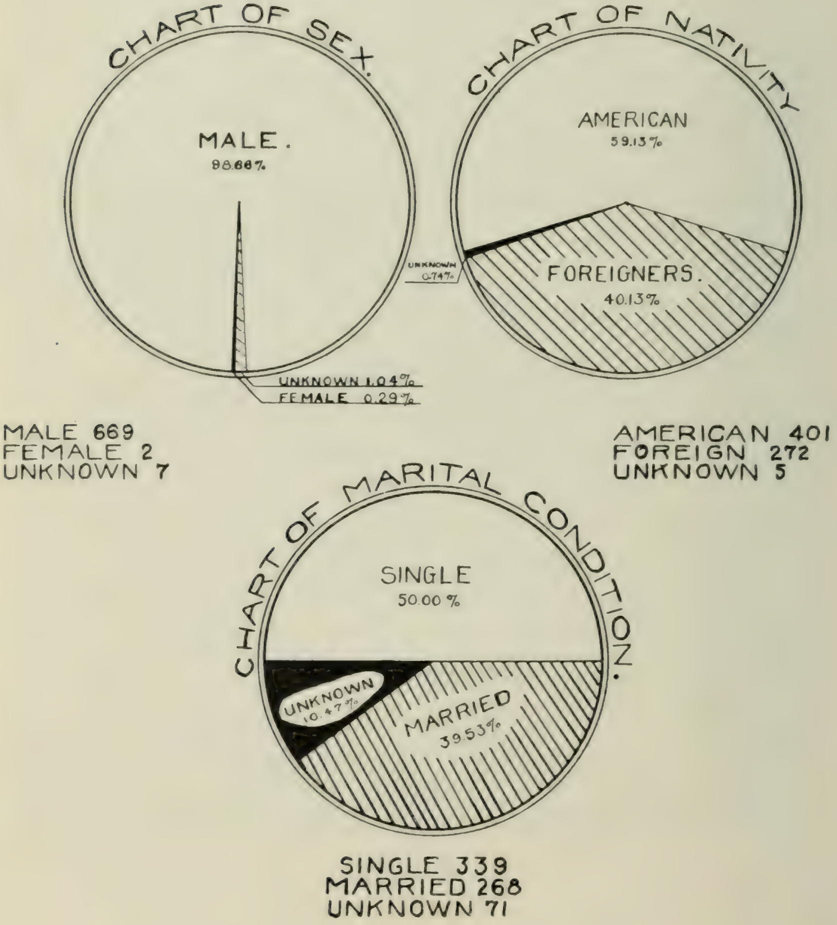
Wage groups	Industries								
	Agriculture	Construction	Extraction	Manufacturing	Service	Trades	Transportation	Unknown	Totals
Under $10	20		1	7	3	2	10		43
$10 to $19	30	64	43	69	14	19	114	2	355
$20 to $29	2	28	23	30	2	1	77	1	164
$30 to $39	1	11	6	6	1		11		36
$40 to $49		2	1	3	1	1	5		13
$50 to $59		1							1
$60 to $69			2						2
$80 to $89							1		1
Unknown	9	9	10	6	3	1	8	17	63
Totals	62	115	86	121	24	24	226	20	678

Average weekly wages, $19.

CHART OF SEX, NATIVITY AND CONJUGAL CONDITION.

For interesting combinations of these items, see tables appended hereto.

678 FATAL ACCIDENTS
1914.



678 FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

678 Fatal Accidents by Sex, and Industries in Which They Occurred.

Industries	Sex			
	Male	Female	Unknown	Totals
Agriculture	62			62
Construction	115			115
Extraction	83		3	86
Manufacturing	120		1	121
Service	24			24
Trades	22	2		24
Transportation	224		2	226
Unknown	19		1	20
Totals	669	2	7	678

678 FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

678 Fatal Accidents by Nativity and Industries in Which They Occurred.

Industries	Nativity			
	American	Foreign	Unknown	Totals
Agriculture	27	35		62
Construction	66	49		115
Extraction	40	44	2	86
Manufacturing	75	45	1	121
Service	16	8		24
Trades	17	7		24
Transportation	146	80		226
Unknown	14	4	2	20
Totals	401	272	5	678

678 FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

678 Fatal Accidents by Marital Condition, and Industries in Which They Occurred.

Industries	Marital condition			
	Married	Single	Unknown	Totals
Agriculture	17	40	5	62
Construction	49	53	13	115
Extraction	28	53	5	86
Manufacturing	58	61	2	121
Service	10	12	2	24
Trades	14	8	2	24
Transportation	91	108	27	226
Unknown	1	4	15	20
Totals	268	339	71	678

A STUDY

OF

TWELVE HUNDRED AND NINETY-TWO PERMANENT INJURIES.

1914.

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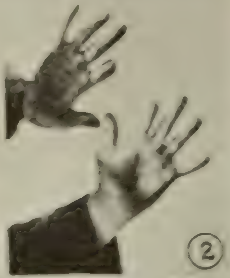
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Piledriver foreman, age 35.
Lost ends of major index, middle, and ring fingers.
Piledriver hammer released and fell on fingers.
Rating: 104 weeks at $18.75 per week.
Total amount, $1,950.00.

(1)

Auto mechanic, age 35.
Lost ends of both index fingers.
Caught hand in gears of air pump. Caught left hand trying to extricate right.
Rating: 48 weeks at $10.40 per week.
Total amount, $499.20.

(2)

Laborer, age 74.
Blood poisoning and ankylosis of hand.
Cut wrist with pruning knife.
Rating: 49 weeks at $7.50 per week.
Total amount, $367.50.

(3)

Baker's helper, age 27.
Lost major index, middle, and ring fingers.
Caught hand in dough mixer.
Rating: 157 weeks at $7.43 per week.
Total amount, $1,166.51.
He can never become a journeyman baker.

(4)

Shaper, age 37.
Middle phalanx of minor thumb removed and distal phalanx resected to metacarpal.
Piece of timber slipped on jointer.
Rating: 42 weeks at $18.75 per week.
Total amount, $787.50.

(5)

Marine oiler, age 29.
Lost major index at proximal joint.
Was feeling around low pressure eccentric straps.
Rating: 35 weeks at $9.91 per week.
Total amount, $346.85.
What chances has he to become a marine engineer?

(6)

Auto-truck driver, age 47.
Lost major ring finger.
Infection following bruise of hand.
Rating: 37 weeks at $15 per week.
Total amount, $555.

(7)

Cabinet maker, age 31.
Lost minor thumb, middle, ring, and little fingers.
Trying to plane a small piece of wood on a planer.
Rating: 140 weeks at $13.12 per week.
Total amount, $1,836.80.
He has a hard time finding a job.

(8)

Pile-driver man, age 33.
Lost ends of all fingers, minor hand.
Overbalanced; caught hand in block under cable.
Rating: 122 weeks at $20.75 per week.
Total amount, $2,531.50

(9)

Edgerman, age 25.
Lost minor index finger at proximal joint.
Pulling edger saws into place while running; clothing caught on saws.
Rating: 29 weeks at $12.19 per week.
Total amount, $353.51.

(10)

Laborer, age 44.
Lost major middle finger.
Infection caused by splinter from carrying lumber.
Rating: 33 weeks at $8.44 per week.
Total amount, $278.52.

(11)

Cabinet maker, age 51.
Lost major middle finger above proximal joint.
Sliver from pine board caused infection.
Rating: 39 weeks at $15 per week.
Total amount, $585.

(12)

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Porter, age 40.
Lost minor arm below elbow.
Attempted to leave a moving train; coat pocket caught on door.
Rating: 160 weeks at $7.81 per week.
Total amount, $1,249.60.

(1)

Elevator constructor, age 28.
Lost minor thumb and index finger.
Hand caught between cable and sheave.
Rating: 98 weeks at $15 per week.
Total amount, $1,470.

(2)

Postoffice messenger, age 17.
Lost three toes on left foot.
Motorcycle skidded, caught foot in the sprocket chain.
Rating: 18 weeks at $7.50 per week.
Total amount, $135.

(3)

Laborer, age 32.
Lost minor index and middle fingers, curvature of ring.
Caught fingers between bucket and timbers while straightening bucket.
Rating: 72 weeks at $9.37 per week.
Total amount, $674.64.

(4)

Carpenter, age 54.
Stiffness and enlargement of both hands.
Fell from building.
Rating: 240 weeks at $13.12 per week.
Total amount, $3,148.80.

(5)

Ironworker, age 19.
Lost major arm below elbow.
Guy wires gave way on tower while he was removing them.
Rating: 182 weeks at $16.60 per week.
Total amount, $3,021.20.

(6)

Car cleaner, age 29.
Lost left leg below knee.
Slipped while boarding a moving train.
Is now employed by same company at same wages in shop work.

(7)

Sausage maker, age 53.
Lost one eye.
Knocking hoop off of barrel; piece of steel hit him in the eye.
Rating: 145 weeks at $11.25 per week.
Total amount, $1,631.25.

(8)

Pumper, age 24.
Lost one eye.
Glass tube exploded; piece of glass struck eye.
Rating: 114 weeks at $11.40 per week.
Total amount, $1.299.60.

(9)

Wringer, age 25.
Lost major arm; ankylosis minor elbow.
Slipped on wet floor and fell into wringer rolls.
Rating: 240 weeks at $8.44 per week, and life pension of $1.75 per week.

(10)

Laborer, age 22.
Lost foot in tarsus.
Foot caught in between guard rail and rail. Car ran over foot.
Rating: 106 weeks at $8.44 per week.
Total amount, $894.64.
(Thinks he has lost one-third of his earning power.)

(11)

Fireman, age 56.
Lost major arm below elbow.
Bar slipped while prying roller over and let him fall into gears.
Rating: 219 weeks at $11.25 per week.
Total amount, $2,463.75.

(12)

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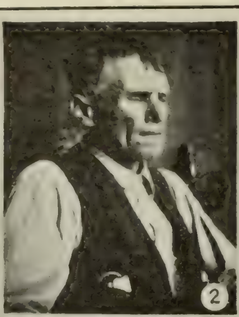
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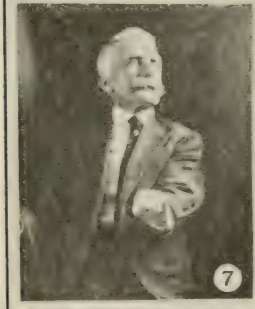
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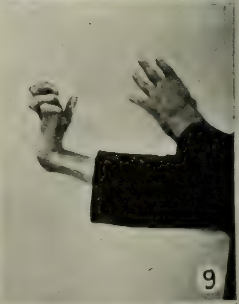
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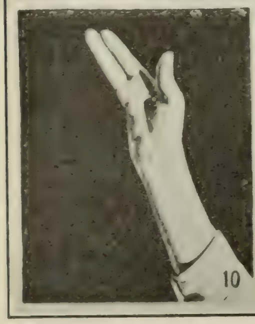
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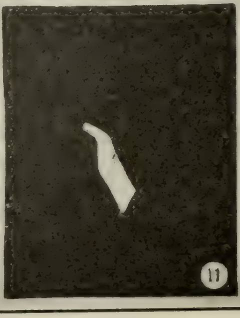
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12

Engineer, age 58.
Lost right eye.
Driving hoop on oil barrel; piece of steel struck eye.
Rating: 167 weeks at 65 per cent of average weekly wage, $11.25.
Total amount, $1,878.75.
(Earning efficiency actually depreciated $30 per month.)

(1)

Laborer, age 53.
Lost right eye.
Chipping hole in sidewalk; piece of cement struck eye.
Rating: 132 weeks at 65 per cent of wages.
Total amount, $1,236.84.

(2)

Miner, age 60.
Lost right eye.
Breaking ore; piece struck eye.
Rating: 139 weeks at 65 per cent of average weekly wages.
Total amount, $2,018.28.

(3)

Expressman.
Lost both legs above the ankles.
Knocked off of auto truck by street car and run over.
Rating: 240 weeks at $8.44, and a life pension of $3.25 per week.

(4)

Engineer, age 24.
Lost left leg below knee joint.
Log caught on guy rope and rolled off of logging car.
Rating: 146 weeks at 65 per cent of weekly wage, $12.19.
Total amount, $1.779.74.

(5)

Lineman, age 21.
Lost right leg above the knee.
While riding motorcycle, collided with street car.
Rating: 194 weeks at $12.19 per week.
Total amount, $2,364.86.

(6)

Carpenter, age 62.
Lost minor arm below elbow.
Block of wood slipped on planer.
Rating: 237 weeks at $10.30 per week.
Total amount, $2,441.10.
(Wages now 40 per cent of former wages. Lucky to have a job.)

(7)

Engineer, age 33.
Lost major arm below elbow.
Slipped and fell into cog wheel, while oiling track of caterpillar engine.
Rating: 194 weeks at $18.75 per week.
Total amount, $3,637.50.

(8)

Machinist, age 34.
Burns of both arms and both legs.
Rating: 95 per cent.
Settlement made of $5,000 and hospital expense.

(9)

Laborer, age 30.
Lost major ring and little fingers, with metacarpus.
Thrown into gear while putting belt on moving pulleys.
Rating: 101 weeks at 65 per cent of average weekly wage.
Total amount, $798.91.

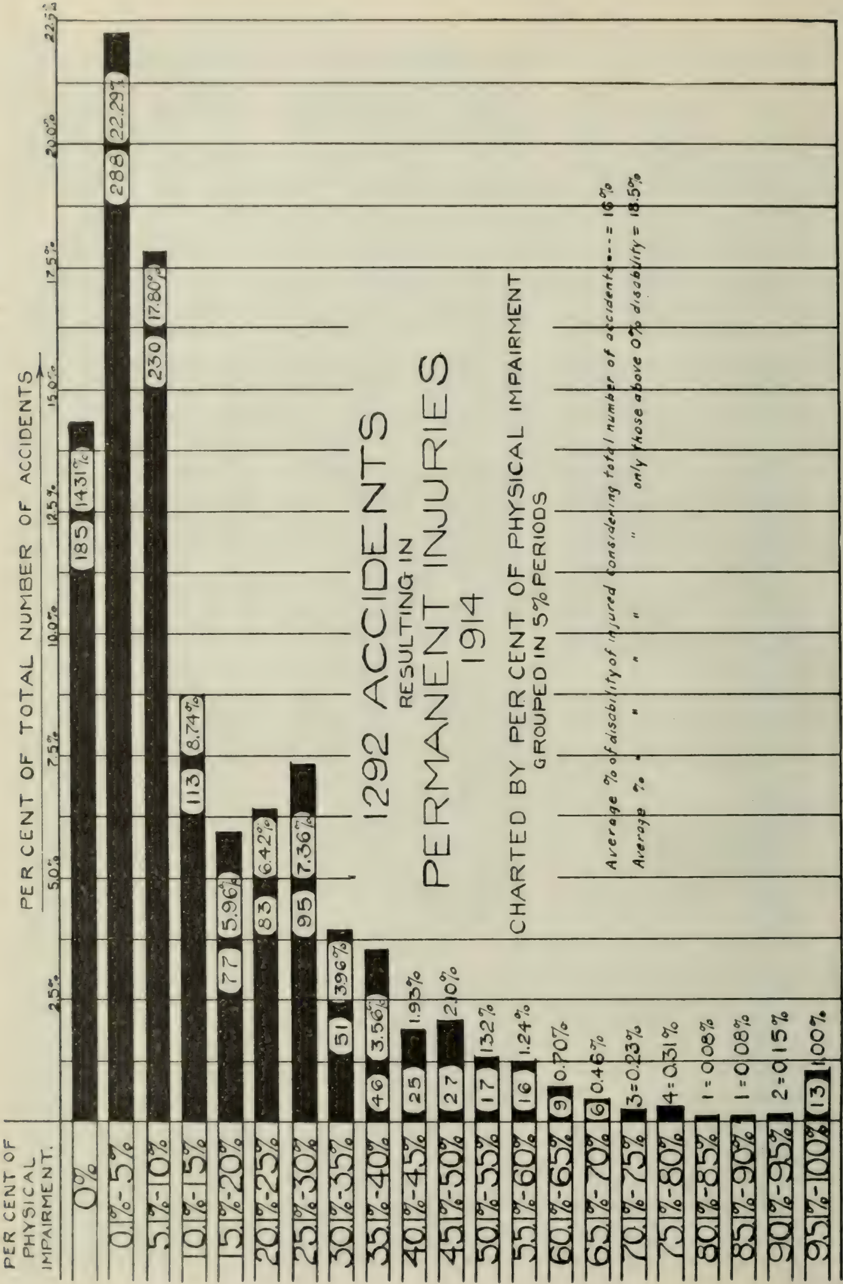
(10)

Mangle hand, age 35.
Lost major hand, excepting thumb.
Straightening a sheet on mangle, when it started up, dragging hand into mangle.
Rating: 130 weeks at 65 per cent of average weekly wage.
Total amount, $690.30.

(11)

Candymaker, age 27.
Lost major arm above elbow.
Opening can of pineapple, cut finger, became infected.
Rating: 228 weeks at 65 per cent, $10.09.
Total amount, $2,300.52.

(12)


1292 ACCIDENTS
RESULTING IN
PERMANENT INJURIES
1914
CHARTED BY PER CENT OF PHYSICAL IMPAIRMENT
GROUPED IN 5% PERIODS
Average % of disability of injured considering total number of accidents --- = 16%
Average % " " " " only those above 0% disability = 18.5%
PER CENT OF TOTAL NUMBER OF ACCIDENTS
2.5%
5.0%
7.5%
10.0%
12.5%
15.0%
17.5%
20.0%
22.5%
PER CENT OF PHYSICAL IMPAIRMENT.
0%
185
14.31%
0.1%-5%
288
22.29%
5.1%-10%
230
17.80%
10.1%-15%
113
8.74%
15.1%-20%
77
5.96%
20.1%-25%
83
6.42%
25.1%-30%
95
7.36%
30.1%-35%
51
3.96%
35.1%-40%
46
3.56%
40.1%-45%
25
1.93%
45.1%-50%
27
2.10%
50.1%-55%
17
1.32%
55.1%-60%
16
1.24%
60.1%-65%
9
0.70%
65.1%-70%
6
0.46%
70.1%-75%
3=0.23%
75.1%-80%
4=0.31%
80.1%-85%
1=0.08%
85.1%-90%
1=0.08%
90.1%-95%
2=0.15%
95.1%-100%
13
1.00%

PERMANENT INJURIES.

1,292 Permanent Injuries.

If breathing, eating and seeing the light of day is considered any advantage, some of the twelve hundred and ninety-two (1,292) men who were permanently injured in 1914 are better off than those who were killed outright, although some of the pictures shown in this report are strong arguments in favor of the latter. In some instances it seems that the greater part of the man is dead and buried, and that only a remnant remains. The thought undoubtedly is not a cheerful one for a whole man, and it is easy to imagine how grievous it must be to the injured.

About thirty (30) of those who received permanent injuries are so badly disabled that they will require some support as long as they live. More than a thousand of these men are so mutilated that no military organization would muster them in, and at the rate at which they are injured each year in this State, an army corps is retired within the brief span of a man's life.

Parts of Body Most Frequently Hurt.

Elsewhere in this report will be found a complete and detailed statement of about every permanent injury which happened in this State in 1914. Each man who had part of his body cut up or mashed to a pulp, or suffered even less, was compared with a normal man who was sound in body and mind and an effort was made in each case to measure the difference.

This loss was expressed in per cents and when such varying items as occupation, age and wage were given proper credit, it was possible to determine, with a fair degree of accuracy, how much each man was below normal.

Taking everything into consideration, it was determined that, on an average, each man who fell in this class had lost about eighteen or nineteen per cent of his economic self. That is to say, he is worth to himself and to society about eighty-two per cent (82%) of his original value.

The part of the body which is most affected is naturally the extremities, the edges of the body. Fingers and hands come first; feet follow; head and eyes are close in order. Man's feelers, the very things he needs most, both to keep his body away from danger, to break impact, and to supply his wants, are the things that fare the worst. Chopping off a finger does not hurt as much nor as long as a rupture, but in the majority of cases, an operation restores the latter and does not affect the man's earning power, while if his work requires delicate touch, the man who lost the end of his finger is sore put.

Pictures of Injured.

Without going farther into details of the numbers and natures of these serious injuries, attention is directed to the above-mentioned list of permanent injuries, and to the pictures of a few of the workmen who were permanently injured. In this connection, it should be stated that this Commission feels keenly the delicacy of holding up before the public the misfortunes of others. The *only* reason for so doing is because it seems impossible to give the public a better object lesson in any other way. On these grounds and for this purpose alone, would a workman permit the use of his picture. The workmen did not voluntarily offer their pictures; the Commission sought them. It was first thought that only the injury itself would be photographed, but aside from the difficulty of doing this in some cases, it occurred that the genuineness of the subject might be questioned. Hence, many of the features of the injured appear. Names of employees or employers are not used, but if desired such information will be furnished at the discretion of the Commission.

Liability for Permanent Injuries.

The total liability of insurance companies and employers for permanent injuries and for pensions which arose out of accidents in 1914, was $1,200,088.78. This amount is not the present value, which would be slightly less, nor does it include liability for medical services. This liability, based on the schedule measurements, covers 1,292 cases, of which about 480 were not covered by insurance. If all this money should go to the injured, on an average he would get about nine hundred and twenty-five dollars ($925.00). Of this amount, $283,521.59 has been reported paid to the permanently injured. This averages, per case, about $210.00. It will be remembered that this average was $126.84 in 1913 and $169.00 in the early part of 1914.

This small average indicates one thing at least and perhaps two things. This money is to be paid over long periods of time, hence the lowness of the figures at the present time. It may mean that the injured does not get all that is due him on account of the insolvency of his employer or insurance carrier, or, he may be employed on farms whose owners have not elected to accept the compensation provisions of the Act, or interstate railroads, which would, of course, absolve the employer of all liability for compensation, but not always for damages under the liability law.

One Important Function of the Statistical Department.

Occasion is taken here to show how serious injuries are traced by the Statistical Department. It ought to be clear that the department is not a passive institution, designed to accept such data as may be submitted by employers and insurance companies.

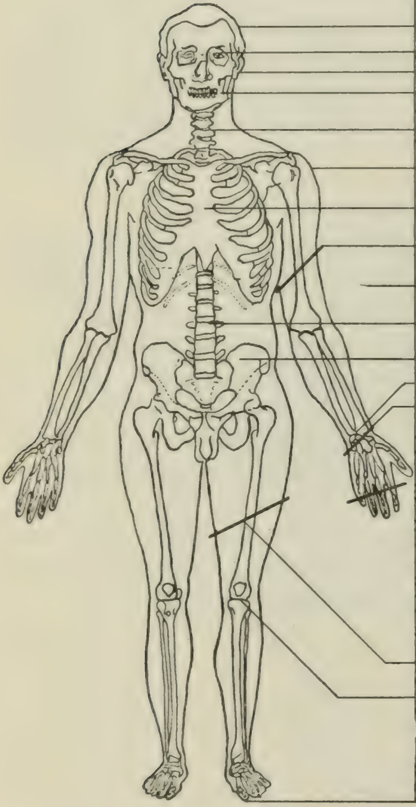
On the contrary, nearly every report of accident is checked with from two to three versions of the incident. If it be seen that the injured is disabled to the extent that he deserves compensation, a card is sent him which outlines to him his rights under the Act. Requests are also sent to employer and insurance companies for their payments and disposition of the case.

Especially is this true of permanent and fatal injuries. The importance of this feature of the work can be realized when it is recalled that not more than one-third of the death cases in a year are reviewed by the Commission, and perhaps not half of the permanent injury cases. Unless this is done, we can not hope for the earliest and widest influence of the Act to be experienced.

Study Permanent Injuries for a Period of Years.

Theoretically, if the same workman gets chopped up periodically, after awhile, if he is not all gone, he will be practically in that condition, and it would be desirable that at that time all the payments which he received from time to time should equal an amount sufficient to take care of him. As compensation is money for value received and not charity, the recipient has a right to do with it much as he pleases, but he should please to make the best use of his money and opportunities and not squander the former or waste the latter, and then fall back on society for sustenance. It can be expected that some cases of this kind will occur, but they should be the exception. To know just what does actually take place, and how the injured progresses, backward or forward, is not only of passing interest, but should serve proper ends.

CHART OF 1292 PERMANENT INJURIES GROUPED BY PART OF BODY AFFECTED.
1914.



GROUP INJURIES.	NUMBER IN GROUP
SKULL	3
EYES	172
EARS	9
FACE	5
NECK	2
BURNS OF BODY	4
CHEST	2
ARM AMPUTATIONS	28
ARM ANKYLOSIS	42
SPINE	17
PELVIC REGION	3
WRIST ANKYLOSIS	30
ONE HAND AMPUTATIONS	12
BOTH HANDS AMPUTATED	1
ANKYLOSIS OF FINGERS	100
AMPUTATION OF 1 FINGER	482
AMPUTATION OF 2 FINGERS	81
AMPUTATION OF 3 FINGERS	30
AMPUTATION OF 4 FINGERS	18
AMPUTATION OF 5 FINGERS	3
COMB. LOSS AND ANKYLOSIS OF FINGERS	51
CURVATURE AND CONTRACTURE	11
LEG AMPUTATIONS	45
ANKYLOSIS OF JOINTS OF LEG	63
MULTIPLE INJURIES	18
MISCELLANEOUS INJURIES	6
TOE AMPUTATIONS	54
TOTAL	1292

Causes of Permanent Injuries.

With this object in view, the Statistical Department should continue its investigations along these lines from year to year, at least of the serious and type cases. The chart of 1,292 permanent injuries which have been grouped by the part of the body affected, shows that in 1914 it was necessary to amputate 45 legs, while 63 legs were injured so that all degrees of stiffness of the joint resulted. The same is true of about 42 arms and about 30 wrists, which were so stiff that it is difficult to use them. Twenty-eight arms were amputated and 54 toes. About 12 men were compelled to have at least one hand amputated, and one man lost both hands. One hundred and seventy-two eyes suffered all degrees of blindness; many were taken out; and many others, although not removed and apparently without blemish, were rendered sightless. More than 600 fingers were lost by workmen last year in all combinations, from the loss of from two to five fingers, to the loss of some fingers and a stiffening of others.

Reference to the chart of causes of permanent injuries and the industries in which the accidents occurred, shows that machinery in the manufacturing industry is the chief factor. Next in order of causes is the object which falls, rolls or comes with great speed upon the workman, and either severs or crushes a part of the body beyond repair. If costs indicate anything, the machine accidents are the most severe, machine accidents costing approximately $122,000.00, while those of falling objects, the next most serious cause, resulted in an expenditure of nearly $80,000.00. The two costs taken together total about $40,000.00 more than all other causes combined which were responsible for the same character of injury. It is a very striking fact, however, that only in the case of permanent injuries do machine accidents take the lead. Reference to the table of causes of accidents resulting in permanent injuries shows that machinery is responsible for more than 40 per cent of the accidents, while the table of causes of those accidents which resulted in temporary injury shows machinery to be responsible for only about eight or nine per cent. The same is true with reference to those accidents which terminated fatally.

Such an experience covering machine accidents as we have for permanent injuries is not contrary to expectation. When an accident occurs around a machine, the probability is that it will be a clean-cut accident, with a shock of instant pain and with no large shattered area, as would be apt to be the case in a fall from a high place, or if struck by a huge boulder. There are many more accidents due to falls and falling objects than to machinery, but the likelihood of their causing permanent injuries is not so great as the probability of their terminating fatally if they are serious at all. We have already noted that falling objects compared with machinery is responsible for twice as many fatal accidents, and there is abundant evidence confirming this observation in the tables and charts relating to temporary injuries. There, falling, rolling and flying objects head the list in numbers of accidents, while machinery comes fifth in order of number of accidents, but fourth in order of severity.

As much the same may be said about causes of accidents under the study of any particular type, occasion is taken here to discuss "causes" in general, under the head of "Causes of accidents which result in permanent injury." Continuing the analysis of the machinery accidents in connection with these due to the falling of the man himself, we have the following situation:

Five thousand seven hundred and fifty-two machine accidents caused a loss of over 74,000 days' time, and more than $144,000.00.

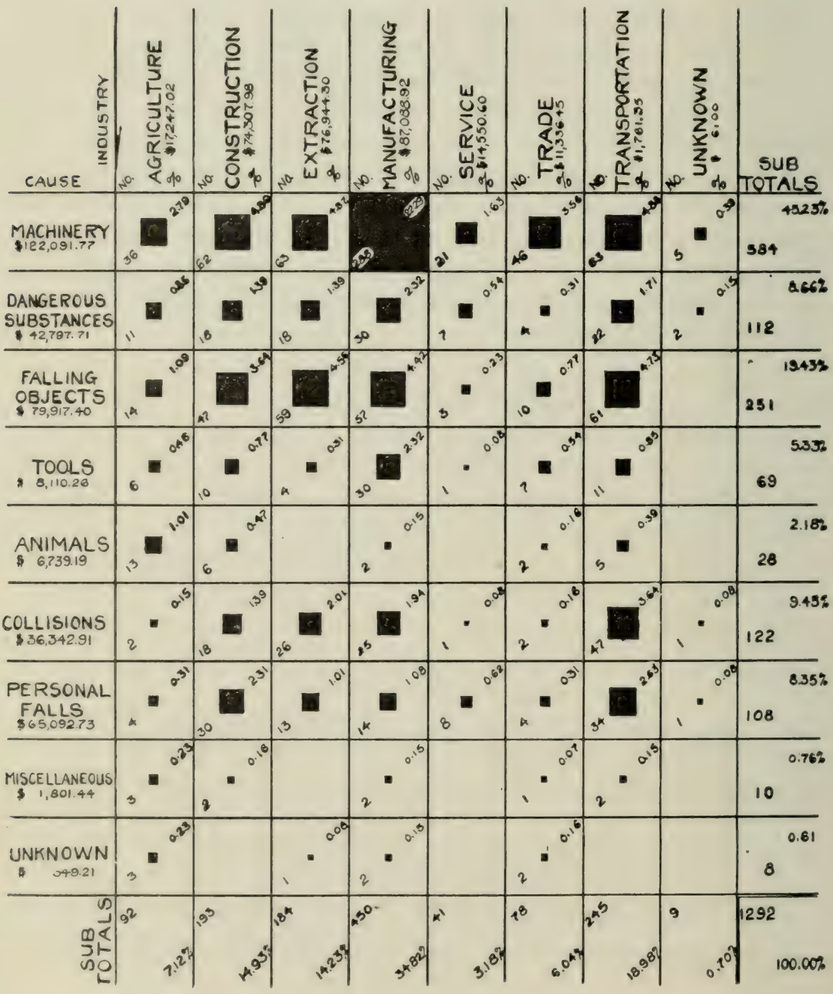
Nine thousand one hundred and sixteen accidents due to the workman falling, caused a loss of 171,000 days' time, or more than $339,215.07. Of the 5,752 machine accidents, the most of any one class occurring under this head were those which happened while cranking automobiles or some type of gas motor. Next in order of responsibility of the 5,752 accidents under consideration were those incident to crude hoisting apparatus. Looking at the 9,116 cases of falls, we find the largest class of accidents under this head were falls on comparatively level surfaces, where there was seemingly nothing to aggravate the situation but irregularity of floors, unevenness of the earth, slippery surfaces, or perhaps, an overbalancing heavy-weight.

Without due consideration of the matter, one might conclude that the majority of the accidents were avoidable and that the guilt rests entirely with the employee. Not infrequently, the statement is made that 90 per cent of the accidents are preventable, leaving the impression that this percentage of the accidents are the result of gross negligence, and that only 10 per cent are "pure" accidents. It may be true that only 10 per cent of the accidents are pure, that is, an accidental breaking of something which all human calculation had determined as being safe, or when an unsuspected combination of gases occurred, or forces interfered which were beyond human control, but this class of accidents is very small, and it must be admitted that the personal factor nearly always enters into the other and larger class. It is unsafe, however, to jump at the conclusion that this human factor is closely related to misconduct on the part of the employee. Sixty thousand men, who can least afford to suffer and lose time and money, can scarcely be said to rush into trouble with a clear consciousness of the results. Some accidents result from foolishness; some from carelessness on the part of the injured; some are "pure" accidents, but it seems that the best explanation is found in the almost universal lack of co-ordination between a man's mind and his body. That is to say, the question of accident is almost inseparable from the physiological and, consequently, the mental, condition of the man. A man with a dead liver, or a vivid imagination, makes a poor aviator or structural steel worker. A man with a leaky heart is a "bad risk" on the top of a scaffold. The same is true with machinery. A bad bearing, or a leaky steam chest, and industry pays for it. The economy is false; cheap clothes, cheap food, cheap labor, and cheap machinery never have and never will bring the desired results. They are always more expensive in the end. If an automobile is to render the best service, it must have the best care. Likewise, with the man who labors in industry; if he is not to be a burden and a loss to industry, he must have reasonable attention. The continued recognition of this economic law and its persistent application will, no doubt, compensate society beyond its hopes.

Charts and Tables.

Before passing to the study of the temporary injuries, attention is directed to the many interesting charts and tables of permanent injuries, and to the list which shows the rating of each injury and its money value.

CHART OF 1292 PERMANENT INJURIES. BY CAUSE AND INDUSTRY



CAUSE / INDUSTRY	AGRICULTURE $17,247.02		CONSTRUCTION $74,307.98		EXTRACTION $76,944.30		MANUFACTURING $87,088.92		SERVICE $14,550.60		TRADE $11,336.45		TRANSPORTATION $1,781.35		UNKNOWN $ 6.00		SUB TOTALS	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%		
MACHINERY $122,091.77	36	2.79	62	4.80	63	4.87	288	22.29	21	1.63	46	3.56	63	4.88	5	0.39	584	45.23%
DANGEROUS SUBSTANCES $ 42,797.71	11	0.85	18	1.39	18	1.39	30	2.32	7	0.54	4	0.31	22	1.71	2	0.15	112	8.66%
FALLING OBJECTS $ 79,917.40	14	1.09	47	3.64	59	4.56	57	4.42	3	0.23	10	0.77	61	4.72			251	19.43%
TOOLS $ 8,110.26	6	0.46	10	0.77	4	0.31	30	2.32	1	0.08	7	0.54	11	0.85			69	5.33%
ANIMALS $ 6,739.19	13	1.01	6	0.47			2	0.15			2	0.16	5	0.39			28	2.18%
COLLISIONS $36,342.91	2	0.15	18	1.39	26	2.01	25	1.94	1	0.08	2	0.16	47	3.64	1	0.08	122	9.45%
PERSONAL FALLS $65,092.73	4	0.31	30	2.31	13	1.01	14	1.08	8	0.62	4	0.31	34	2.63	1	0.08	108	8.35%
MISCELLANEOUS $ 1,801.44	3	0.23	2	0.16			2	0.15			1	0.07	2	0.15			10	0.76%
UNKNOWN $ 549.21	3	0.23			1	0.08	2	0.15			2	0.16					8	0.61
SUB TOTALS	92	7.12%	193	14.93%	184	14.23%	450	34.82%	41	3.18%	78	6.04%	245	18.98%	9	0.70%	1292	100.00%

EXPLANATION.

The chart opposite shows the industries wherein permanent injuries were suffered and the chief causes of these injuries.

The relative responsibilities of any particular industry and main cause of permanent injuries is indicated by the amount of surface blocked out in white. The unit of measurement determining the size of the unit square is the number of injuries occurring in the manufacturing industry and due to machinery. This class of accidents was the largest of the permanent injuries and was therefore made the unit of measurement. The responsibility of the remaining industries and causes is blocked out on a downward scale.

1,292 ACCIDENTS RESULTING IN PERMANENT INJURY.

Time: 12 months—January 1 to December 31, 1914.

Table Showing Cause of Accidents and Cost of Compensation and Medical Benefits.

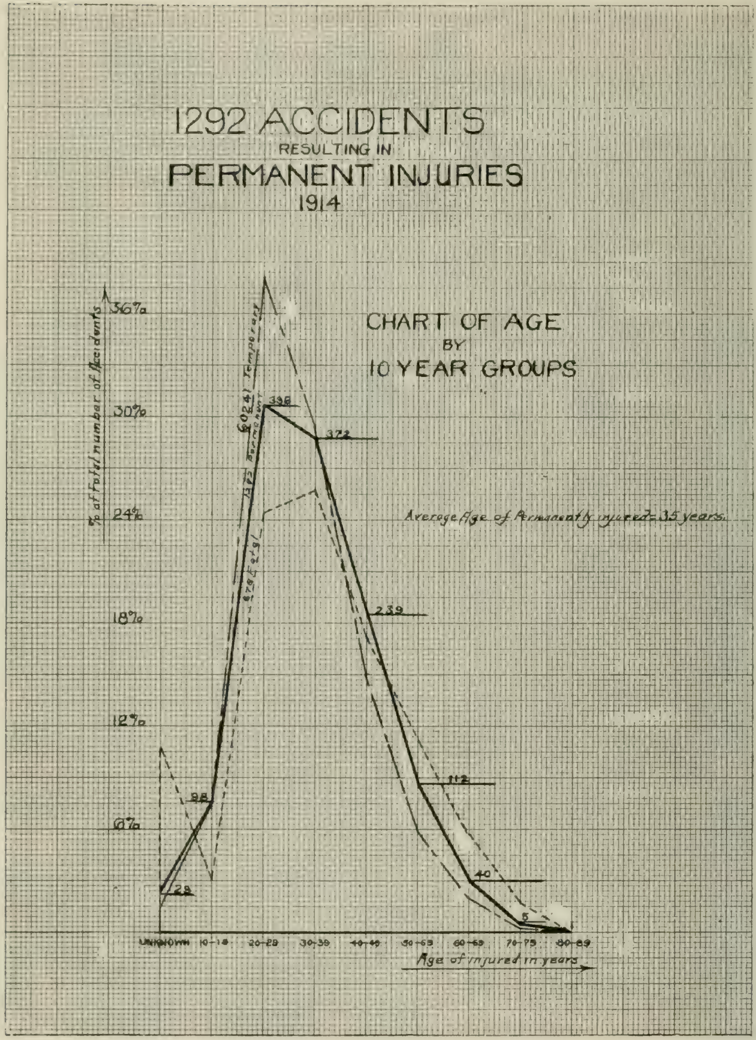
Cause	Number of cases	Compensation	Medical	Total compensation and medical benefits
Machinery	584	$99,661 98	$22,429 79	$122,091 77
Dangerous substances	112	29,650 06	13,147 65	42,797 71
Falling, rolling and flying objects	251	61,993 52	17,923 88	79,917 40
Tools	69	6,267 20	1,843 06	8,110 26
Animals	28	4,720 59	2,018 60	6,739 19
Collisions	122	29,394 46	6,948 45	36,342 91
Falls	108	50,032 48	15,060 25	65,092 73
All others	10	1,656 24	145 20	1,801 44
Unknown	8	145 06	204 15	349 21
Totals	1,292	$283,521 59	$79,721 03	$363,242 62

A STUDY OF 1,292 PERMANENT INJURY ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Table Showing What Each Industry Paid in Compensation and Medical Benefits.

	Compensation	Medical benefits	Total
Agriculture	$11,400 45	$5,846 57	$17,247 02
Construction	59,259 91	15,048 07	74.307 98
Extraction	58,560 11	18,384 19	76,944 30
Manufacturing	69,854 24	17,234 68	87,088 92
Service	10,589 52	3,961 08	14,550 60
Trades	7,667 30	3,669 15	11,336 45
Transportation	66,190 06	15,571 29	81,761 35
Unknown	-------------	6 00	6 00
Totals	$283,521 59	$79,721 03	$363,242 62


1292 ACCIDENTS
RESULTING IN
PERMANENT INJURIES
1914
CHART OF AGE
BY
10 YEAR GROUPS
% of total number of Accidents
36%
30%
24%
18%
12%
6%
60241 Temporary
1292 Permanent
178 Fatal
398
372
239
112
40
5
98
28
Average Age of Permanently injured = 35 years.
UNKNOWN
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
Age of injured in years

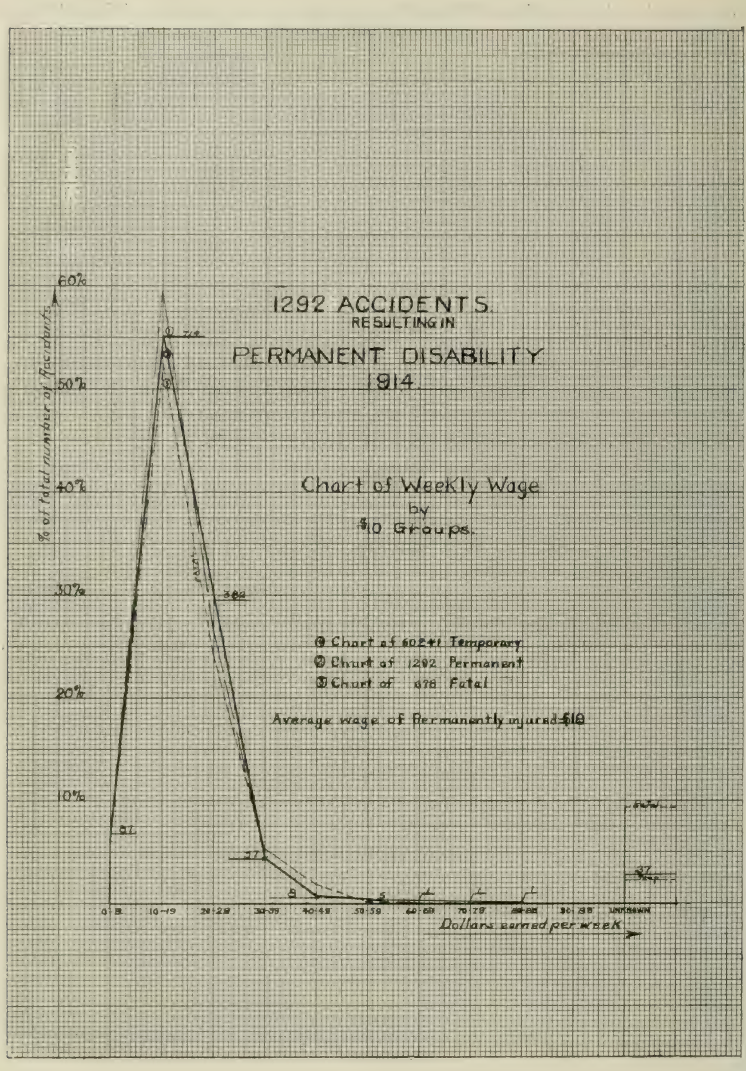
1,292 ACCIDENTS RESULTING IN PERMANENT INJURY.

Time: 12 months—January 1 to December 31, 1914.

Grouped by Age Periods (Ten-Year Groups) and by Industries Where Accidents Occurred.

Age groups	Industries								
	Agriculture	Construction	Extraction	Manufacturing	Service	Trades	Transportation	Unknown	Total
10 to 19	4	10	3	51	4	16	9	1	98
20 to 29	19	59	55	155	11	24	72	1	396
30 to 39	28	55	53	118	10	20	88	--------	372
40 to 49	19	38	48	74	9	9	42	--------	239
50 to 59	9	23	18	30	3	5	24	--------	112
60 to 69	7	6	4	13	2	1	6	1	40
70 to 79	2	--------	--------	1	--------	--------	2	--------	5
80 to 89	1	--------	--------	--------	--------	--------	--------	--------	1
Unknown	3	2	3	8	2	3	2	6	29
Totals	92	193	184	450	41	78	245	9	1,292

Average age of those permanently injured, 35 years.


1292 ACCIDENTS
RESULTING IN
PERMANENT DISABILITY
1914.
Chart of Weekly Wage
by
$10 Groups.
① Chart of 60241 Temporary
② Chart of 1292 Permanent
③ Chart of 478 Fatal
Average wage of Permanently injured $18
60%
50%
40%
30%
20%
10%
% of Total number of Accidents
714
382
81
57
8
5
1
1
1
37
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
UNKNOWN
Dollars earned per week

1,292 ACCIDENTS RESULTING IN PERMANENT INJURY.

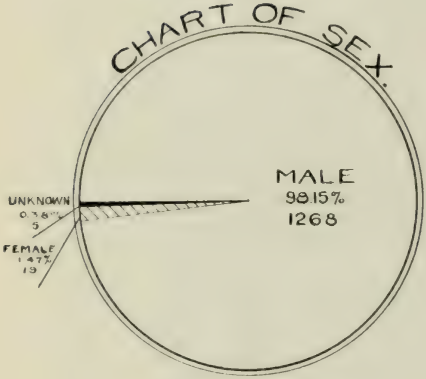
Time: 12 months—January 1 to December 31, 1914.

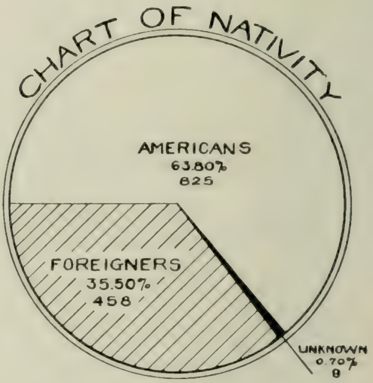
Grouped by Wage Periods (Ten-Dollar Groups) and by Industries Where Accidents Occurred.

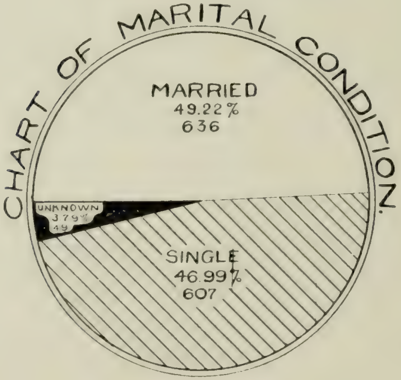
Wage groups	Industries								
	Agriculture	Construction	Extraction	Manufacturing	Service	Trades	Transportation	Unknown	Total
Under $10	12	4	1	36	7	12	15	--------	87
$10 to $19	49	92	101	263	25	37	145	2	714
$20 to $29	20	72	64	121	5	25	75	--------	382
$30 to $39	2	19	10	18	3	--------	5	--------	57
$40 to $49	--------	5	2	1	--------	--------	--------	--------	8
$50 to $59	--------	--------	3	2	--------	--------	--------	--------	5
$60 to $69	--------	--------	--------	1	--------	--------	--------	--------	1
$80 to $89	--------	--------	1	--------	--------	--------	--------	--------	1
Unknown	9	1	2	8	1	4	5	7	37
Totals	92	193	184	450	41	78	245	9	1,292

Average weekly wage of those permanently injured, $19.00.

1292 ACCIDENTS
RESULTING IN
PERMANENT DISABILITY







1,292 ACCIDENTS RESULTING IN PERMANENT INJURY.

Time: 12 months—January 1 to December 31, 1914.

By Sex, and Industries in Which They Occurred.

Industries	Sex			
	Male	Female	Unknown	Total
Agriculture	92			92
Construction	191		2	193
Extraction	183		1	184
Manufacturing	442	7	1	450
Service	33	8		41
Trades	75	3		78
Transportation	243	1	1	245
Unknown	9			9
Totals	1,268	19	5	1,292

1,292 ACCIDENTS RESULTING IN PERMANENT INJURY.

Time: 12 months—January 1 to December 31, 1914.

By Nativity, and Industries in Which They Occurred.

Industries	Nativity			
	American	Foreign	Unknown	Total
Agriculture	62	27	3	92
Construction	131	61	1	193
Extraction	101	81	2	184
Manufacturing	288	161	1	450
Service	26	14	1	41
Trades	56	22		78
Transportation	154	91		245
Unknown	7	1	1	9
Totals	825	458	9	1,292

1,292 ACCIDENTS RESULTING IN PERMANENT INJURY.

Time: 12 months—January 1 to December 31, 1914.

By Marital Condition, and Industries in Which They Occurred.

Industries	Marital condition			
	Married	Single	Unknown	Total
Agriculture	36	47	9	92
Construction	112	81		193
Extraction	90	90	4	184
Manufacturing	214	220	16	450
Service	23	18		41
Trades	35	39	4	78
Transportation	125	111	9	245
Unknown	1	1	7	9
Totals	636	607	49	1,292

1,292 ACCIDENTS RESULTING IN PERMANENT INJURY.

Time: 12 months—January 1 to December 31, 1914.

Grouped in 5 Per Cent Periods of Physical Impairment and the Industries Where They Occurred.

Percentage of physical impairment	Industries								
	Agriculture	Construction	Extraction	Manufacturing	Service	Trades	Transportation	Unknown	Total
0	15	29	24	62	8	15	31	1	185
Under 5	17	25	47	117	4	23	54	1	288
5.1 to 10	15	32	17	102	7	14	41	2	230
10.1 to 15	12	21	17	37	7	5	14	--------	113
15.1 to 20	3	16	10	23	1	5	18	1	77
20.1 to 25	9	21	14	26	1	1	11	--------	83
25.1 to 30	12	14	13	25	6	6	18	1	95
30.1 to 35	1	7	14	18	--------	5	6	--------	51
35.1 to 40	4	7	5	13	2	2	13	--------	46
40.1 to 45	--------	4	3	6	1	--------	11	--------	25
45.1 to 50	--------	4	9	6	3	--------	5	--------	27
50.1 to 55	3	3	1	6	--------	--------	4	--------	17
55.1 to 60	1	4	3	4	--------	1	2	1	16
60.1 to 65	--------	1	1	1	1	1	4	--------	9
65.1 to 70	--------	1	2	--------	--------	--------	3	--------	6
70.1 to 75	--------	2	--------	--------	--------	--------	1	--------	3
75.1 to 80	--------	--------	--------	--------	--------	--------	4	--------	4
80.1 to 85	--------	1	--------	--------	--------	--------	--------	--------	1
85.1 to 90	--------	--------	--------	--------	--------	--------	1	--------	1
90.1 to 95	--------	--------	--------	--------	--------	--------	2	--------	2
95.1 to 100	--------	1	4	4	--------	--------	2	2	13
Totals	92	193	184	450	41	78	245	9	1,292

A STUDY

OF

SIXTY THOUSAND TWO HUNDRED FORTY-ONE TEMPORARY INJURIES.

1914.

60241 ACCIDENTS
RESULTING IN
TEMPORARY DISABILITY
1914

CHARTED BY CHARTACTER OF MEDICAL TREATMENT

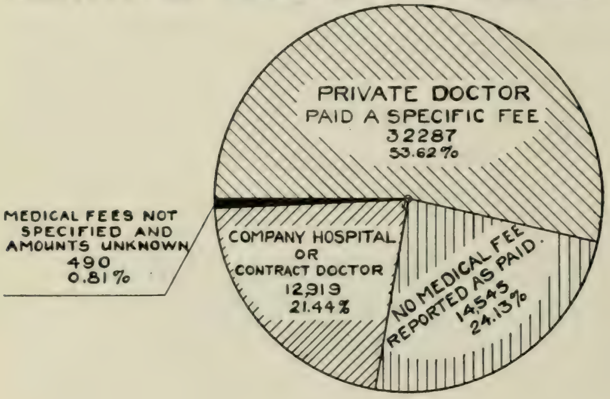
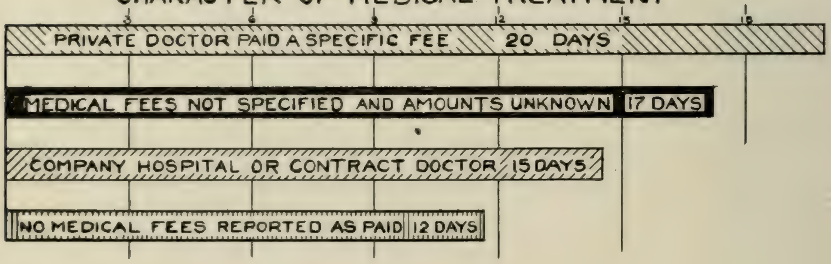


CHART SHOWING AVERAGE TIME LOST PER CASE BY CHARACTER OF MEDICAL TREATMENT



A STUDY OF 60,241 TEMPORARY INJURIES.

Time Lost Through Temporary Injury.

The sixty thousand two hundred and forty-one (60,241) accidents which occasioned only temporary disability, caused a loss in time of six hundred and ninety-five thousand three hundred and ninety-four (695,394) days. This converted into three hundred (300) day years, gives a total lost time of twenty-three hundred and eighteen (2,318) years. Translated into terms of men, this means that over two thousand men are out of industry for the entire year. These men, if uncompensated, last year would have sustained a loss in wages of about $2,000,000.00, assuming that the average annual earnings amounted to $900.00 and not taking into consideration present money values.

Compensation Paid for Temporary Injuries (1914).

Against these figures of wage loss is set the sum of $604,743.00, which employers and insurance companies paid in compensation for temporary injuries. Of the 60,241 temporary accidents, only 12,737 caused disability lasting fifteen days or more, and were, therefore, accounted as compensable. Considering only these compensable cases, the average compensation paid was $47.48.

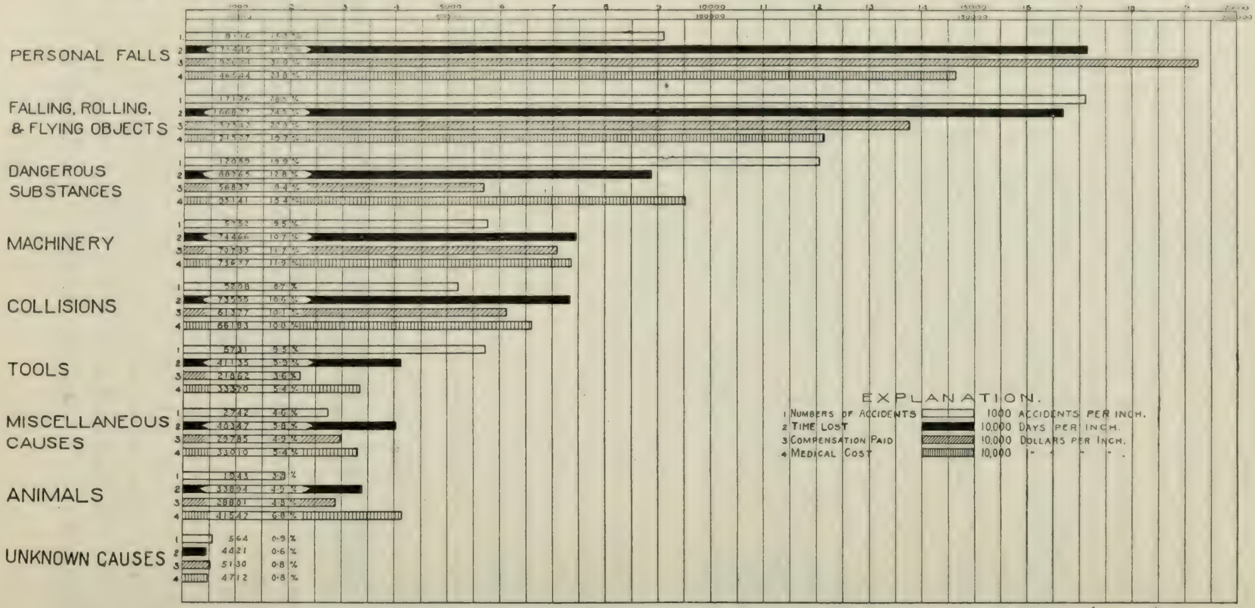
Medical Payments for Temporary Injuries.

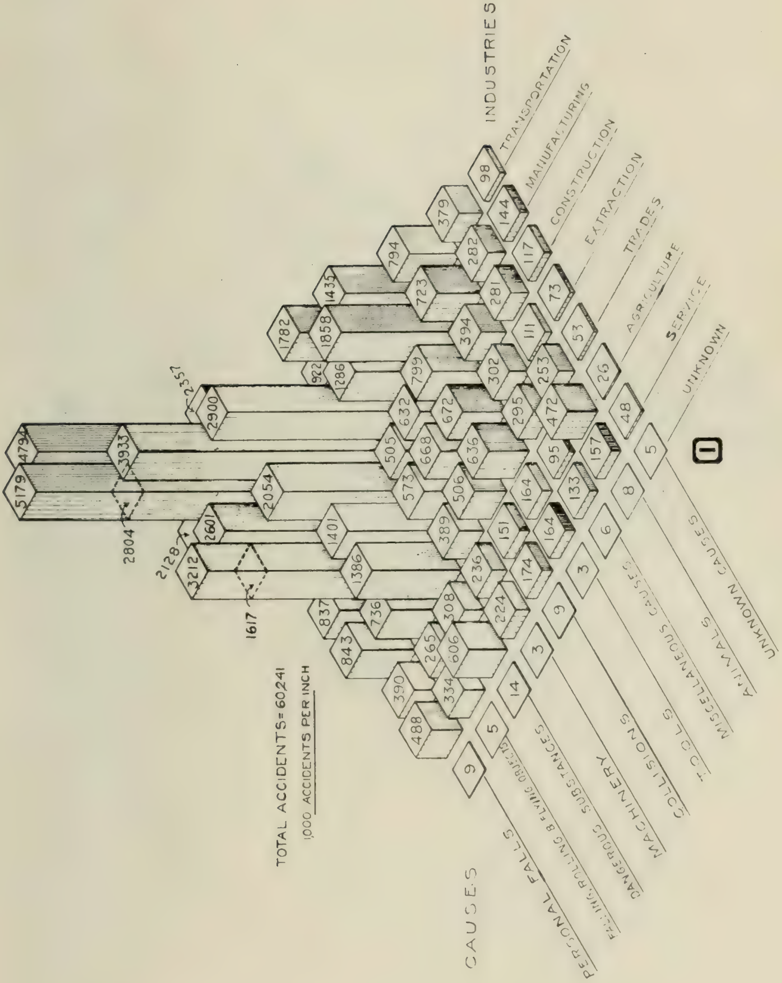
In the cases of temporary injury it seems that medical costs run a little better than dollar for dollar. Over six hundred thousand dollars ($615,706.24) were paid out for medical services for temporary injuries alone; or an average of about nineteen dollars ($19.06) per case considered. The character of the treatment, whether by company hospital or by contract with physicians, etc., will be clearly seen by reference to the chart.

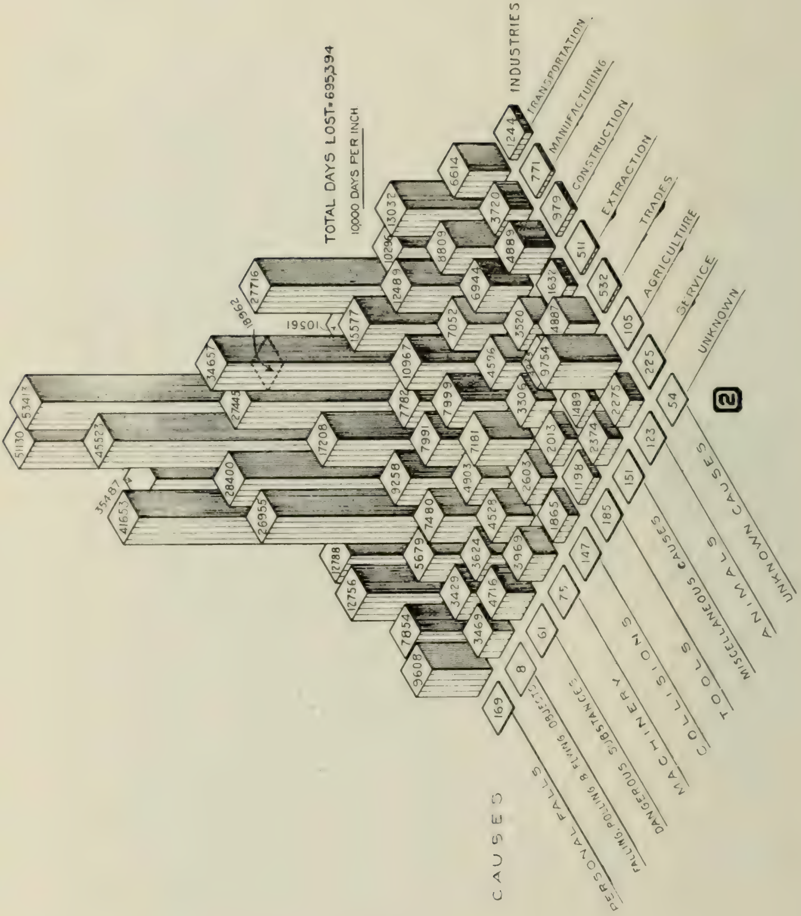
Disability by Character of Treatment.

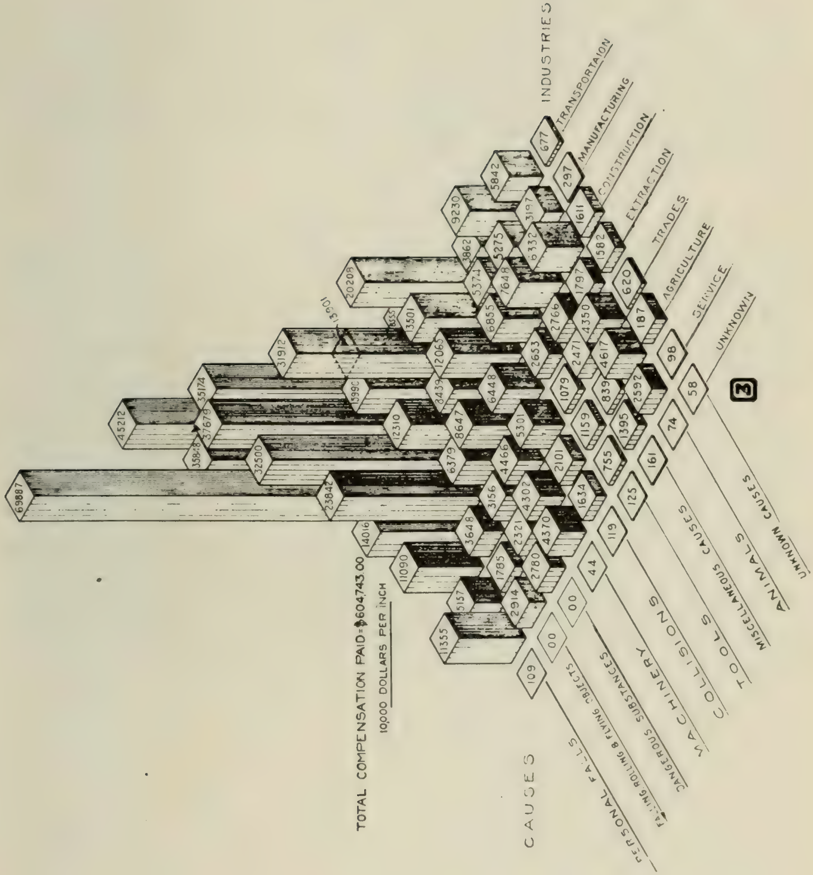
It is also of interest to note the length of disability by the character of medical treatment. The length of the four lines on the bottom of the above-mentioned chart is determined, not by the number of accidents treated (this is shown in the circle), but by the average time consumed in recovery. When the injured was cared for by private physician, the average time-period required to recover was twenty (20) days. When the patient was cared for by contract or in a company hospital, the injured recovered in about fifteen (15) days. In fourteen thousand five hundred and forty-five (14,545) cases, medical fees were reported as not paid. Disability in these cases lasted only twelve (12) days.

CORRELATION OF CAUSES WITH NUMBER OF ACCIDENTS, TIME LOST, COMPENSATION PAID AND MEDICAL COST.




TOTAL ACCIDENTS = 60241
1,000 ACCIDENTS PER INCH
INDUSTRIES
TRANSPORTATION
MANUFACTURING
CONSTRUCTION
EXTRACTION
TRADES
AGRICULTURE
SERVICE
UNKNOWN
CAUSES
PERSONAL FALLS
FALLING, ROLLING & FLYING OBJECTS
DANGEROUS SUBSTANCES
MACHINERY
MACHINES
COLLISIONS
TOOLS
MISCELLANEOUS CAUSES
ANIMALS
UNKNOWN CAUSES
I
5179
4794
3933
2804
2900
2357
2054
2601
2128
3212
1617
1782
1858
1435
922
1286
1401
1386
837
736
843
794
379
98
723
282
144
281
117
394
799
632
505
573
668
672
302
111
73
53
253
295
472
26
48
636
506
389
236
308
265
606
390
334
488
164
95
157
133
151
164
174
224
5
8
6
3
9
3
14
5
9


TOTAL DAYS LOST-695,394
10,000 DAYS PER INCH
INDUSTRIES
TRANSPORTATION
MANUFACTURING
CONSTRUCTION
EXTRACTION
TRADES
AGRICULTURE
SERVICE
UNKNOWN
CAUSES
PERSONAL FALLS
FALLING, ROLLING & FLYING OBJECTS
DANGEROUS SUBSTANCES
MACHINERY
COLLISIONS
TOOLS
MISCELLANEOUS CAUSES
ANIMALS
UNKNOWN CAUSES
2
51130
53417
45527
41653
35487
34657
27743
28400
26955
27716
18962
10561
17208
15577
13032
12756
12788
10967
10296
12489
9608
9258
8809
7854
7999
7991
7782
7480
7181
7052
6944
6614
5679
4903
4889
4887
4716
4596
4528
3969
3720
3624
3520
3469
3429
3306
2603
2374
2275
2013
1865
1632
1489
1244
1198
979
771
532
511
225
185
169
151
147
123
105
75
61
54
8


TOTAL COMPENSATION PAID=$604,743.00
10,000 DOLLARS PER INCH
INDUSTRIES
TRANSPORTAION
MANUFACTURING
CONSTRUCTION
EXTRACTION
TRADES
AGRICULTURE
SERVICE
UNKNOWN
CAUSES
PERSONAL FALLS
FALLING ROLLING & FLYING OBJECTS
DANGEROUS SUBSTANCES
MACHINERY
COLLISIONS
TOOLS
MISCELLANEOUS CAUSES
ANIMALS
UNKNOWN CAUSES
3
69887
45212
35174
37679
35848
31912
13901
20208
32500
23842
14016
11090
5157
11355
15990
12310
1355
13501
12065
8439
8647
6379
3156
3648
1785
2914
2321
4302
2780
4370
4466
5301
6448
2653
6855
5374
7648
3862
9230
5842
5275
3197
6332
2766
1797
2471
4350
1079
4617
839
2592
1159
1395
2101
755
1634
1611
1582
620
187
98
58
74
161
125
119
44
00
00
109
677
297

Average Disability for Temporary Injuries.

The average time loss for all cases where disability lasted through the day of injury or longer was about seventeen (16.8) days. This average does not include cases where time was not lost, in which case the accident was reportable only because medical aid was required.

Average Cost per Accident Reported in 1914.

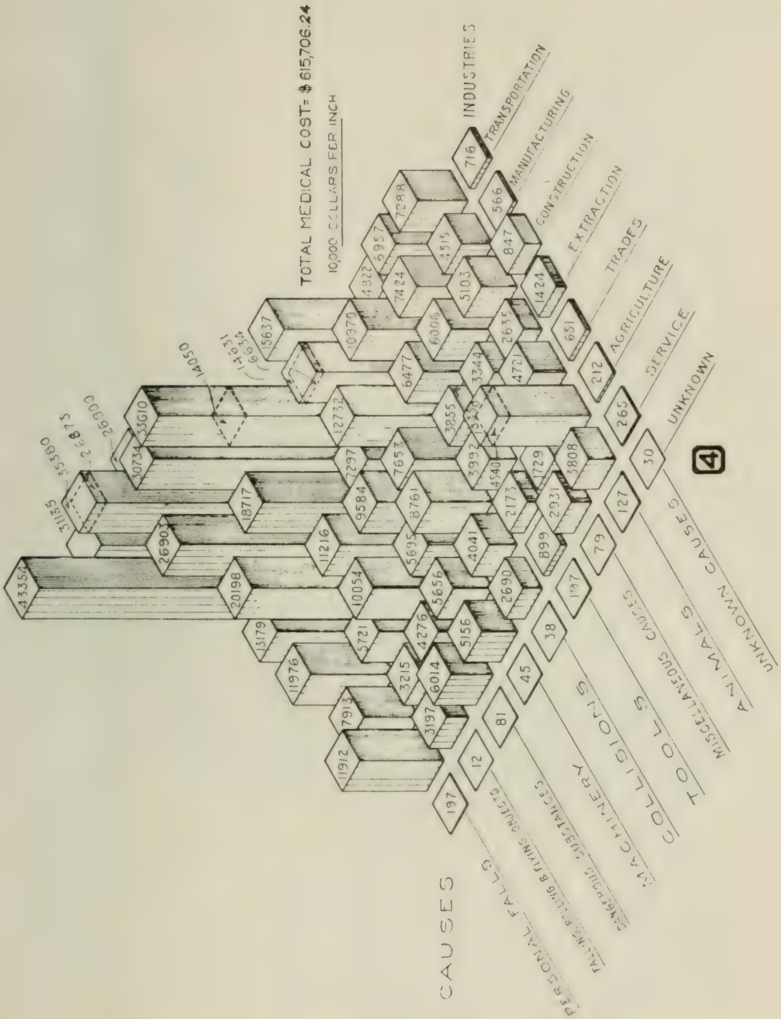
One million two hundred and twenty thousand four hundred and forty-nine dollars and twenty-four cents ($1,220,449.24) was paid in compensation and medical benefits in 1914 for sixty thousand two hundred and forty-one accidents which caused temporary disability, or a simple average cost per case reported of twenty dollars and twenty-five cents ($20.25).

Causes of Temporary Injuries.

Perhaps enough has been said about causes of accidents to convey to the reader the general impressions of those who have, perhaps unscientifically, attempted to tabulate physiological hazards. Conclusions are not commands, and the figures and charts are ample evidence of the problem.

Attention, however, should be called to the very interesting charts which, in a general way, indicate the severity of the temporary injuries, showing the number resulting from any chief cause.

Falls, in particular, afford a very striking example of this. The number of falls is all out of proportion with the accidents resulting from the other causes. The charts marked 1, 2, 3, and 4 are to be read together, as it is possible to read the results of any group of accidents in any main industry or cause by time lost, amounts paid in compensation and medical benefits.


TOTAL MEDICAL COST= $615,706.24
10,000 DOLLARS PER INCH
INDUSTRIES
TRANSPORTATION
MANUFACTURING
CONSTRUCTION
EXTRACTION
TRADES
AGRICULTURE
SERVICE
UNKNOWN
CAUSES
PERSONAL FALLS
FALLING, PRESSING & FLYING OBJECTS
DANGEROUS SUBSTANCES
MACHINERY
COLLISIONS
TOOLS
MISCELLANEOUS CAUSES
ANIMALS
UNKNOWN CAUSES
4
43354
31135
35380
26873
26900
30734
33610
14050
14631
6634
15637
10370
4822
6957
7288
26903
18717
12732
7297
6477
6006
7424
4515
5103
20198
11216
9584
7653
3855
3344
2635
1424
847
566
716
13179
10054
5695
8761
3992
1320
4721
651
11976
5721
5656
4041
2173
4540
1729
3808
212
265
30
7913
3215
4276
5156
2690
899
2931
1912
3197
6014
197
12
81
45
38
197
79
127

Industries Where Temporary Injuries Occur.

The factors of industry and cause remain constant, and the height of the columns is determined by the third factor, either time lost in days, number of accidents, compensation in dollars, or medical expenditures. No industry or branch of industry is exempt from accidental injury to its employees. In point of numbers of accidents the industries stand in order thus:

(1) Manufacturing.
(2) Transportation.
(3) Construction.
(4) Mining, quarrying, etc.
(5) Mercantile trades.
(6) Service—General.
(7) Agriculture.

The responsibility for accidents in each of these groups is not determined by the number of the accidents alone. Any accurate determination of such a result must be made from data of the number of men exposed in each industry group, together with the severity of the injury. Even an accident frequency must consider the severity of accident to be a proper test. But, as a matter of interest, a chart of severity which disregards frequency of accident by industries has been made. This chart changes the order of industry from that given above.

All accidents were reduced to compensation weeks and each industry group took its order from the total compensation weeks for which it became liable. Fatal accidents were rated at two hundred and forty compensation weeks, and permanent injuries were rated according to schedules.

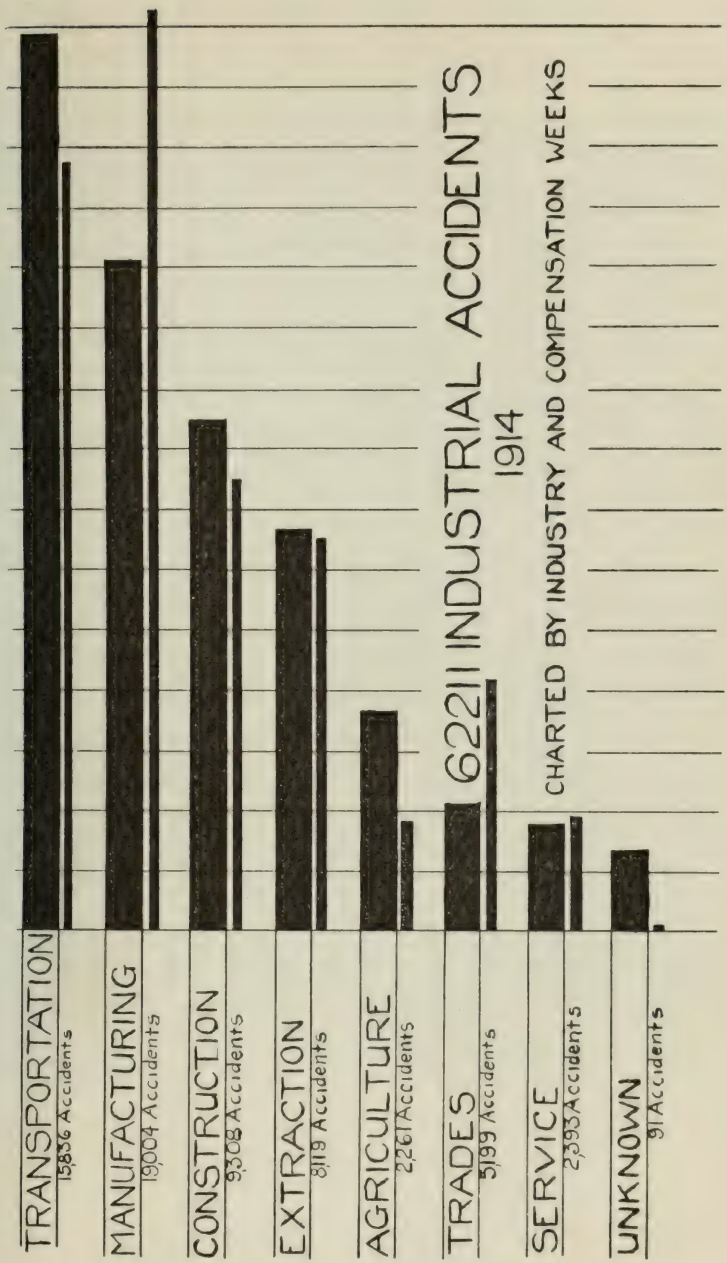
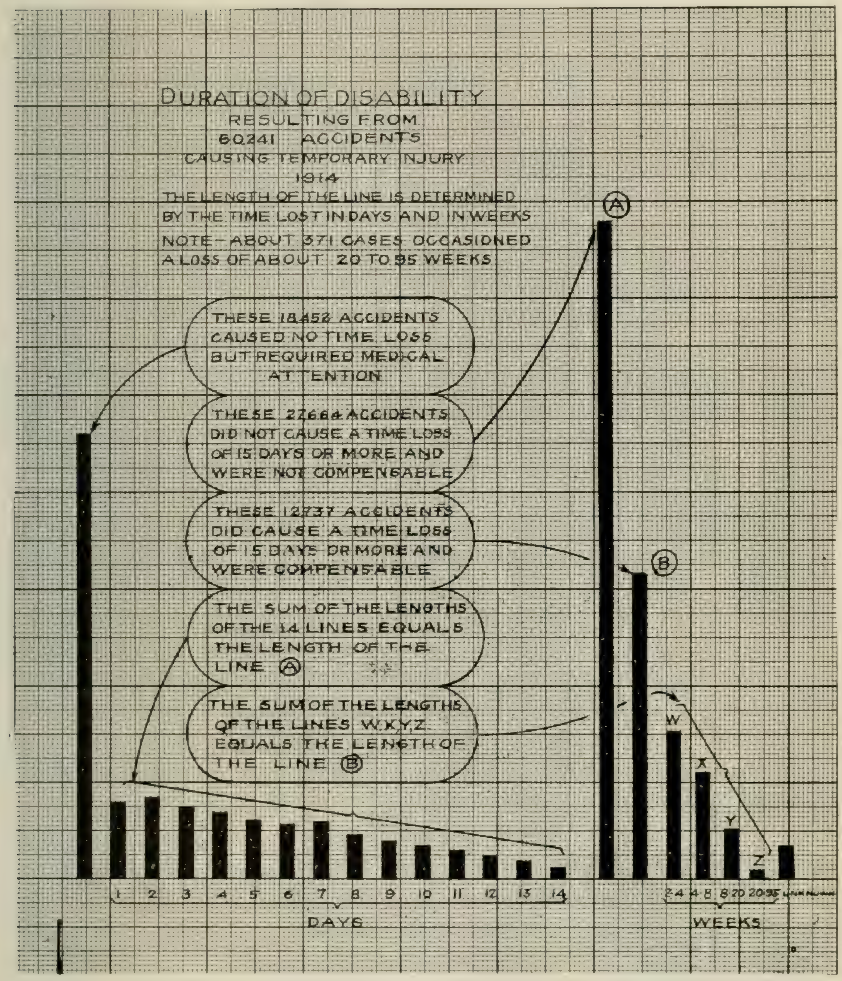

62211 INDUSTRIAL ACCIDENTS
1914
CHARTED BY INDUSTRY AND COMPENSATION WEEKS
TRANSPORTATION
15,836 Accidents
MANUFACTURING
19,004 Accidents
CONSTRUCTION
9,308 Accidents
EXTRACTION
8,119 Accidents
AGRICULTURE
2,261 Accidents
TRADES
5,199 Accidents
SERVICE
2,393 Accidents
UNKNOWN
91 Accidents

CHART OF INDUSTRY AND COMPENSATION WEEKS.

The length of the broad top line of this chart is determined by the number of weeks' time for which each industry group was liable for compensation (excluding liability for medical services). The fatal accidents were charged to each group at the rate of two hundred and forty (240) compensation weeks. Permanent injuries were charged to each group according to schedule rating. Temporary injuries, not disabling over two weeks, were not considered.

The length of the narrow bottom line is determined by the number of accidents chargeable to each industry group. Fatal accidents and accidents causing permanent injuries are included in these figures. The disparity in the length of the lines of each group shows that the number or frequency of accidents is no measure of their severity.

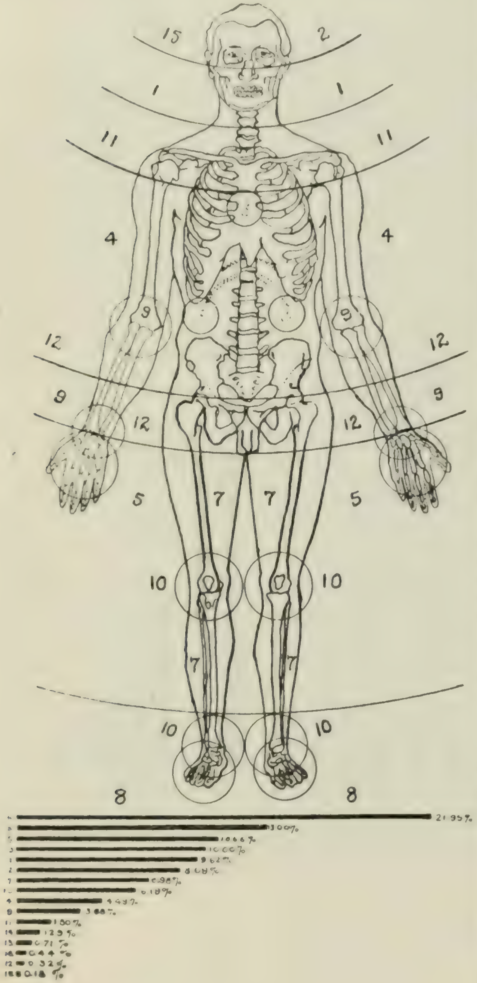
A further study of industries has been made and a chart of numbers of accidents and costs precedes each division.


DURATION OF DISABILITY
RESULTING FROM
60241 ACCIDENTS
CAUSING TEMPORARY INJURY
1914
THE LENGTH OF THE LINE IS DETERMINED
BY THE TIME LOST IN DAYS AND IN WEEKS
NOTE – ABOUT 371 CASES OCCASIONED
A LOSS OF ABOUT 20 TO 35 WEEKS
THESE 18452 ACCIDENTS
CAUSED NO TIME LOSS
BUT REQUIRED MEDICAL
ATTENTION
THESE 27664 ACCIDENTS
DID NOT CAUSE A TIME LOSS
OF 15 DAYS OR MORE AND
WERE NOT COMPENSABLE
THESE 12737 ACCIDENTS
DID CAUSE A TIME LOSS
OF 15 DAYS OR MORE AND
WERE COMPENSABLE
THE SUM OF THE LENGTHS
OF THE 14 LINES EQUALS
THE LENGTH OF THE
LINE Ⓐ
THE SUM OF THE LENGTHS
OF THE LINES W.X.Y.Z.
EQUALS THE LENGTH OF
THE LINE Ⓑ
Ⓐ
Ⓑ
W
X
Y
Z
1
2
3
4
5
6
7
8
9
10
11
12
13
14
DAYS
2-4
4-8
8-20
20-35
WEEKS

Charts and Tables.

Many charts and tables follow these industry groups of which nothing need be said in particular. They are self-explanatory.

60241 ACCIDENTS-TEMPORARY
1914
CHARTED BY PART OF BODY INJURED.



15	SUNSTROKE, EXHAUSTION, AND SHOCK.	109	0.18%
14	BULLET WOUNDS & GENERAL INJURIES TO THE ENTIRE BODY.	777	1.29%
1	HEAD NECK FACE	5795	9.62%
2	EYE	5231	8.69%
11	SHOULDER	1082	1.80%
3	CHEST BACK ABDOMEN	6038	10.00%
12	INTERNAL	193	0.32%
13	HERNIA	430	0.71%
4	ARM	2704	4.49%
9	ELBOW WRIST	2215	3.68%
5	HAND	6429	10.66%
6	FINGERS	13212	21.95%
7	LEG	4201	6.98%
10	KNEE & ANKLE	3727	6.19%
8	FOOT	7833	13.00%
16	UNKNOWN	265	0.44%

60,241 NON-FATAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	5,752
Dangerous substances	12,059
Falling objects	17,126
Tools	5,731
Animals	1,943
Collisions	5,208
Personal falls	9,116
All others	2,742
Unknown	564
Total	60,241

TIME LOST IN DAYS, BY CHIEF CAUSES.

Time: 12 months—January 1 to December 31, 1914.

Machinery	74,466
Dangerous substances	88,754
Falling objects	166,876
Tools	41,135
Animals	33,894
Collisions	74,055
Personal falls	171,446
All others	40,347
Unknown	4,421
Total	695,394

AMOUNTS PAID IN COMPENSATION AND MEDICAL BENEFITS, BY CHIEF CAUSES.

Time: 12 months—January 1 to December 31, 1914.

Cause	Compensation	Medical benefits	Totals
Machinery	$70,735 00	$73,677 14	$144,412 14
Dangerous substances	56,837 00	95,140 92	151,977 92
Falling objects	137,542 00	121,525 82	259,067 82
Tools	21,862 00	33,369 74	55,231 74
Animals	28,801 00	41,547 14	70,348 14
Collisions	61,377 00	66,182 66	127,559 66
Personal falls	192,674 00	146,541 07	339,215 07
All others	29,785 00	33,009 95	62,794 95
Unknown	5,130 00	4,711 80	9,841 80
Totals	$604,743 00	$615,706 24	$1,220,449 24

STUDY OF 5,752 MACHINERY ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Air hammers and riveters and all compressed air engines and devices	77
Backfires of motors and engines when cranking or starting	623
Belts, power transmitting, main and secondary	373
Chain transmission	59
Drills, dies, punches, metal stamps and presses	326
Dynamos, gas or internal combustion engines, motors or steam engines	334
Elevators, platform—including skips and buckets	239
Electric fans, motors, etc.	24
Emery wheels	152
Feed rolls of all classes, including mangles and body ironers in laundries	138
Gears and cogs	287
Hoisting apparatus, other than platform elevators	465
Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers	172
Pile-drivers, rope-drivers and bulldozers	9
Saws, band and circular	481
Set-screws	37
Shafting and conveyors	123
Shears, cutters, grinders—Foodstuffs	95
Shears, cutters, grinders—Metals, paper, textiles, etc.	106
Various and unspecified—Agriculture	47
Various and unspecified—Brick, cement and concrete manufacturing	13
Various and unspecified—Construction	45
Various and unspecified—Foodstuffs, manufacturing	90
Various and unspecified—Laundries	48
Various and unspecified—Leather and rubber	7
Various and unspecified—Lumber	81
Various and unspecified—Metals and machinery	309
Various and unspecified—Mines (miscellaneous)	25
Various and unspecified—Oil	7
Various and unspecified—Printing and manufacturing paper	164
Various and unspecified—Power and light	7
Various and unspecified—Textiles	108
All other machines	247
Objects thrown by machinery—as boards from saws, etc.	47
Pumps	44
Machinery without mechanical power	343
Total	5,752

STUDY OF 12,059 DANGEROUS SUBSTANCE ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Acids, caustics, gases and other chemicals	568
Electric currents, flashes, etc.	376
Exploding of bottles and glass bulbs containing liquids or gases, under pressure, excluding steam and water gauges	228
Exploding gauges, water, steam, etc.	21
Glassware breaking while washing same	128
Rough edges of bulk glass, in glass works and breaking up of glass while cutting same, broken pieces of glass lying around in shop, yards, etc.; also protruding from frames, etc.	488
Slivers—steel, wood and thorns	1,251
Pins, needles, staples, tacks, spikes, hooks, etc.	162
Nails	3,068
Hot fragments of solids, metal, pipes and containers of hot substances; hot parts of engines, etc.	546
Hot liquids, excluding hot water under pressure, in open containers, splashing, escaping, etc.	926
Steam, hot water escaping from boilers and steam and hot water containers	220
Flames, unprotected and flare-ups and flare-backs	486
Explosion of dynamite or powder, cartridges, bombs, etc.	91
Explosion of gases and oils, gasoline, in fire-boxes of boilers, tanks of autos, gasoline torches, oil heaters, burners, carbide headlights, etc.	324
Sharp metal edges of movable and fixed bodies, excluding glass bodies	1,271
Loose wire ends	423
Sharp edges of tin cans	235
Sharp edges of bones	147
Burrs on pelts, and fatty poisons of hides, etc.	18
Cement and carbon dust	116
Poison oak	39
Paint	13
Sugar poisoning	16
Snow and ice	5
Excessive arcing of current, producing photofobia	8
Excessive heat in badly ventilated rooms	5
Dangerous gases, not confined in artificial containers	24
Sewerage matter, poisoned water in shafts and pools, crude oil	19
Exposure to the elements	8
Miscellaneous substances, inherently dangerous, producing infection, when care is not exercised in handling	165
All others	57
Foxtails, burrs from hay, etc.	26
Bursting pipes and hose under air pressure	16
Sharp edges of wood, lumber, etc.	124
Sharp edges of rock and brick, etc.	125
Sharp edges (miscellaneous)	66
Rope, strings or wire, slipping through hands, causing burns, cuts and other injuries	88
Eyeglasses breaking	11
Springs recoiling, snapping, etc.	6
Unknown cause	1
Total	12,059

STUDY OF 17,126 FALLING, ROLLING AND FLYING OBJECT ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Flying emery dust resulting in eye injuries only	805
Flying pieces of steel and metal shavings of all kinds, chips of wood, etc., not resulting in eye injuries	939
Sand, gravel, dirt, etc., not resulting in eye injuries	133
Falling and rolling objects when same are not being used or handled	3,115
Falling objects which are being handled or moved in shops or yards by hand (does not include large unmanageable objects, as piles of timber, building materials, etc.)	3,373
Falling objects of large dimensions not being handled, including trees, planks, beams, lumber, scaffolds, and piles of all kinds	1,986
Swinging objects attached to foundations, including derricks and slingloads, swinging ropes, wires and cables, wagon tongues, limbs of trees, etc. (does not include accidents where hoisting machinery itself plays an active part in injury)	425
Falling and rolling rocks and cave-ins in quarries, mines, etc.	1,502
Loading and unloading on car platforms	882
Struck by or jammed in doors, drawers and all objects on hinges or sliding devices	485
Flying objects of large size, such as flying tires and tire rims and boards both when thrown from machinery and otherwise. (For this class, *see*, *also*, the following division under *Machinery:* "Objects thrown by machinery—as boards from saws, etc.")	85
Objects thrown by other persons, such as baseballs, rocks, potatoes, etc.	38
Flying steel, wood and bone particles in eye	1,754
Flying rock, gravel and dust in eye	1,251
Flying glass in eye	29
Flying glass in other parts	6
Collapse of buildings	8
Flying and rebounding objects not attached to foundations, such as ends of boards being stepped on or dropped and flying back, handles of trucks, plows, scrapers, etc., rebounding	309
Unknown cause	1
Total	17,126

TEMPORARY INJURIES.

A STUDY OF 5,731 TOOL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Carelessness or misjudgment in use of tool by injured	4,667
Carelessness or misjudgment in use of tool in hands of fellow workman	301
Defective tools (wrenches slipping, etc.)	576
Tools flying off handles, handles breaking, also tools breaking	108
Constant use of tool causing blisters, strains, etc.	79
Total	5,731

A STUDY OF 1,943 ANIMAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Kicked, stepped on, hooked, knocked down, bitten and attacked by horses, cows, mules and other animals while shoeing, harnessing, milking or otherwise attending same. Forced against fixed and movable objects by animals, caught between objects through sudden moving of same, etc. (Does not include runaways or thrown from animals while riding or driving); also includes being hit by flying objects propelled by feet of animals, etc.	994
Altercations with other employees or persons while in discharge of duties. Also includes accidents resulting from fights, duels, wrestling, etc., when engaged in the production of motion pictures	104
Accidents due to horses, mules and other animals falling or stumbling while being ridden or driven and throwing man either clear or under vehicle or animal. Including all runaways and being thrown from vehicles due to animal agency. (This class includes all falls from animals)	574
Bitten by insects	54
Bitten by rattlesnakes or other reptiles	4
Scratched, clawed or bitten by animals, in connection with motion picture productions, circuses, animal trainers, etc.	23
Attacked by patients, prisoners and inmates of public and private institutions	20
Bitten by dogs, etc., when not handling same, as in case of drivers, etc.	142
Accidents resulting from striking animals with the hands and feet, etc.	7
Knocked down or run over by animals in runaways, etc., where injured was not in vehicle, such as attempting to stop runaways, etc.	21
Total	1,943

A STUDY OF 5,208 COLLISION ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Jams between objects over which injured has no control or which are driven by some external force (such as coupling cars, etc.)	1,597
Pinches and jams between stationary objects not being handled and where no external force is applied (for example—getting the foot caught between a pile of rails and wrenching same)	266
Derailments of all kinds, including falls from bicycles, motorcycles, autos skidding, etc.	565
Collisions between injured person and fixed object (such as hitting hands, knees, feet, head, etc., against partitions, ceilings, etc.)	1,039
Collisions between vehicle and animals (man in vehicle)	11
Collisions, man in vehicle strikes fixed object as switch lever, etc.	30
Vehicle strikes fixed object	53
Shipwrecks, etc.	12
Hit by or run over by vehicle (man not in same)	1,017
Collisions of vehicles	568
Collisions between two persons when either one or both are moving, including being stepped on by another party	50
Total	5,208

A STUDY OF 9,116 ACCIDENTS RESULTING IN PERSONAL FALLS.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Falls from wagons, buggies and similar vehicles, not caused by external force	381
Falls from wagons, buggies and similar vehicles through contributory external force (*see*, *also*, Collisions and derailments, *also* Animals)	131
Falls from motor vehicles, including autos and motorcycles	84
Falls from bicycles	38
Falls from farm implements, road machines and hand cars	59
Falls from steam railroad engines	251
Falls from steam railroad trains and cars	287
Falls from trains and cars due to brakes slipping, handholds breaking, etc.	19
Falls from steam drawn vehicles other than railway (including tractors, rollers, excavators, etc.)	14
Falls from lumber and mine cars	31
Falls from electric cars	59
Falls due to sudden stops and starts of teams	35
Falls due to sudden stops and starts of electric or motor vehicles	10
Falls due to sudden stop and start of trains	105
Falls while boarding or alighting, due to jumping from or on engines	13
Falls while boarding or alighting, due to jumping from or on trains and cars	94
Falls while boarding or alighting, due to jumping from or on automobiles	23
Falls while boarding or alighting, due to jumping from or on wagons	73
Falls while boarding or alighting, due to jumping from or on boats	6
Falls while boarding or alighting, due to slipping from engines	18
Falls while boarding or alighting, due to slipping from trains or cars	38
Falls while boarding or alighting, due to slipping from automobiles	5
Falls while boarding or alighting, due to slipping from wagons	55
Falls while boarding or alighting from engines, due to stepping on rock, into holes, etc.	10
Falls while boarding or alighting from trains or cars, due to stepping on rock, into holes, etc.	24
Falls while boarding or alighting from automobiles, due to stepping on rock, into holes, etc.	1
Falls while boarding or alighting from wagons, due to stepping on rock, into holes, etc.	5
Falls while boarding or alighting from moving engines	4
Falls while boarding or alighting from moving trains and cars	45
Falls while boarding or alighting from moving automobiles	4
Falls while boarding or alighting from moving wagons	6
Falls while boarding or alighting from engines, all others and unspecified	36
Falls while boarding or alighting from trains and cars, all others and unspecified	113
Falls while boarding or alighting from automobiles, all others and unspecified	20
Falls while boarding or alighting from wagons, all others and unspecified	69
Slips on level, hitting object above level of floor	218
Slips on level due to stepping on banana peel, etc.	11
Slips on level due to wet or oily surface	87
Slips on level while carrying heavy objects	200
Slips on level while trucking, rolling objects, wheeling wheelbarrow, etc.	86
Slips on level due to all other causes	343
Slips on level, unspecified cause	804
Losing balance on level, unspecified cause	42
Falls on level due to tools slipping	92
Losing balance on level due to slipping or breaking of ropes, wires or straps	37
Falls on level due to clothes catching on fixed objects, etc.	20

A STUDY OF 9,116 ACCIDENTS RESULTING IN PERSONAL FALLS—Continued.

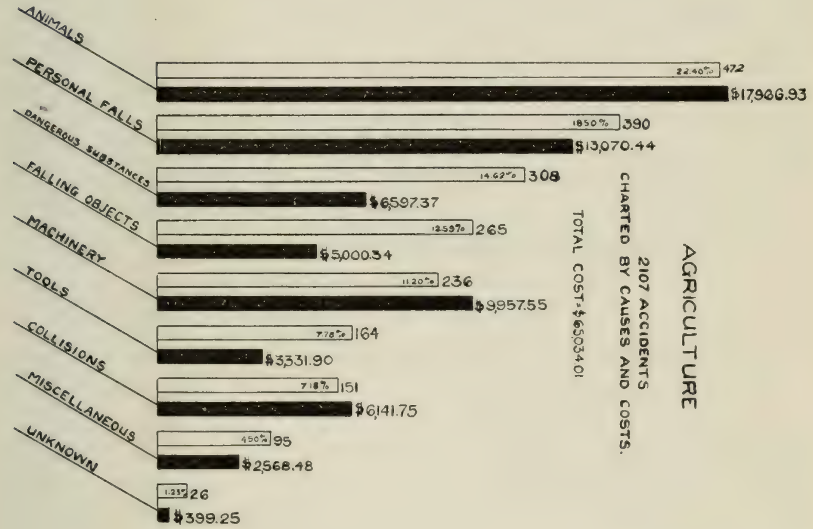
Falls from ladders	465
Falls into elevator shafts	42
Falls from trees	44
Falls due to collapse of staging or scaffolds	280
Falls on level due to stepping into holes or between trestle, etc.	186
Falls on, or down stairways	409
Falls into repairing pits, for railroad and garage	44
Falls into ditches and trenches	36
Falls into tanks and vats	14
Falls through trapdoors	22
Falls into chutes, etc.	30
Falls into manholes	8
Falls into bins and bunkers	12
Falls into hatchways and ship-holds	40
Falls into all other openings	122
Falls on level due to stepping on stones, loose planks and all small objects	297
Falls on level due to tripping (catching foot or stumbling)	575
Falls from staging and scaffolds	371
Falls on level, all others and unspecified	337
Falls from lumber piles	86
Falls from poles	86
Falls from bridges	48
Falls from roofs	85
Falls from elevations in buildings under construction, unspecified cause	133
Falls from platforms used for freighting and shipping	90
Falls from boilers and tanks	37
Falls from windows in buildings	43
Falls down embankments, etc.	49
Falls from haystacks	54
Falls from elevations, all others	312
Falls on level, on deck due to heavy seas, etc.	3
Falls on level due to machine or its parts slipping or breaking	7
Falls on level while acting in moving picture scenes	24
Falls from elevations under six feet, as boxes, chairs, benches, logs, etc.	462
Falls on level while carrying or moving objects, direct cause unspecified	48
Falls on level against objects, unspecified cause	96
Falls from elevations due to straps, ropes, wires, etc., slipping or breaking	12
Unknown cause	1
Total	9,116

A STUDY OF 2,742 ACCIDENTS BY ALL OTHER OR MISCELLANEOUS CAUSES.

Time: 12 months—January 1 to December 31, 1914.

Specific Causes, Locations or Occasions of Accidents.

Handling objects, resulting in strains, ruptures, etc. Slight and severe, including lifting, shoveling, pushing, etc.	2,405
Accidents of all kinds due to *intoxication*	48
Gunshot wounds while on duty (accidental), such as shooting galleries, motion picture productions, gun stores, and all self-inflicted wounds	38
Gunshot wounds while on duty (intentional), policemen, detectives, watchmen, etc.	31
All cases of fainting, fits and strokes of all kinds	79
Occupational diseases of all kinds, infections and abscesses, resulting from work, constitutional disorders arising from working conditions, etc.	61
Sudden twists and turns of the body or parts thereof arising from no external cause	79
Unspecified cause	1
Total	2,742
Unknown causes	564



A STUDY OF 2,107 AGRICULTURAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	236
Dangerous substances	308
Falling objects	265
Tools	164
Animals	472
Collisions	151
Personal falls	390
All others	95
Unknown	26
Total	2,107

2,107 AGRICULTURAL ACCIDENTS.

Time Lost in Days, by Chief Causes.

Time: 12 months—January 1 to December 31, 1914.

Machinery	4,528
Dangerous substances	3,624
Falling objects	3,429
Tools	2,013
Animals	9,754
Collisions	2,603
Personal falls	7,854
All others	1,489
Unknown	105
Total	35,399

2,107 AGRICULTURAL ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

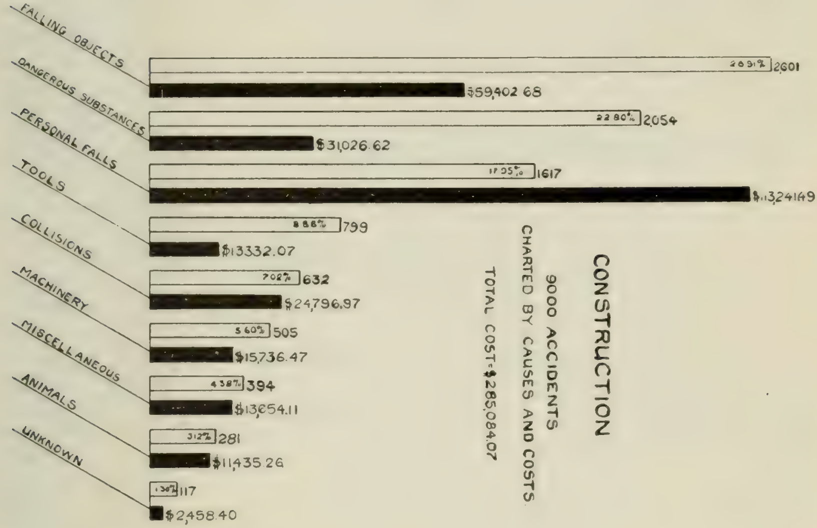
Cause	Compensation	Medical benefits	Total
Machinery	$4,302 00	$5,655 55	$9,957 55
Dangerous substances	2,321 00	4,276 37	6,597 37
Falling objects	1,785 00	3,215 34	5,000 34
Tools	1,159 00	2,172 90	3,331 90
Animals	4,617 00	13,349 93	17,966 93
Collisions	2,101 00	4,040 75	6,141 75
Personal falls	5,157 00	7,913 44	13,070 44
All others	839 00	1,729 48	2,568 48
Unknown	187 00	212 25	399 25
Totals	$22,468 00	$42,566 01	$65,034 01

A STUDY OF 2,107 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

Agriculture.	
General farming (no blasting), horticulture, viticulture, floriculture, nurseries, landscape gardening, hop culture, etc., conservative forestry	1,689
Dairy farming	72
Power farming (machinery—power driven, no blasting)	45
Stock farming (poultry ranches)	144
Garden or truck farming	3
Operating farm machinery—not by farmer—all sorts of threshing, hay baling, etc., where work is sublet	42
Picking, packing, drying and curing of fruits and fumigating	112
Total	2,107

NOTE.—Irrigation plants operated by regular farm laborers fall under the head of *General farming.* All reclamation and irrigation projects operated by a class of labor which never engages in farm work, but follows the construction camp from one district to another, fall under the classification of *Construction.*



9,000 CONSTRUCTION ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Amounts Paid in Compensation and Medical Benefits by Chief Causes.

	Compensation	Medical benefits	Totals
Machinery	$8,439 00	$7,297 47	$15,736 47
Dangerous substances	12,310 00	18,716 62	31,026 62
Falling objects	32,500 00	26,902 68	59,402 68
Tools	6,855 00	6,477 07	13,332 07
Animals	6,332 00	5,103 26	11,435 26
Collisions	12,065 00	12,731 97	24,796 97
Personal falls	69,887 00	43,354 49	113,241 49
All others	7,648 00	6,006 11	13,654 11
Unknown	1,611 00	847 40	2,458 40
Totals	$157,647 00	$127,437 07	$285,084 07

A STUDY OF 9,000 CONSTRUCTION ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	505
Dangerous substances	2,054
Falling objects	2,601
Tools	799
Animals	281
Collisions	632
Personal falls	1,617
All others	394
Unknown	117
Total	9,000

9,000 CONSTRUCTION ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Time Lost in Days by Chief Causes.

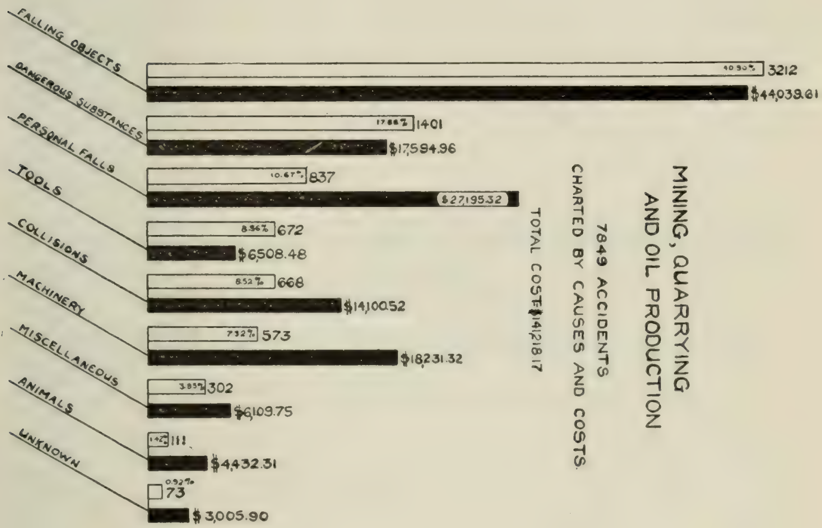
Machinery	7,782
Dangerous substances	17,208
Falling objects	28,400
Tools	7,052
Animals	4,889
Collisions	10,967
Personal falls	41,653
All others	6,944
Unknown	979
Total	125,874

A STUDY OF 9,000 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

Construction.

Clearing, wrecking, moving, salvaging, etc.	87
All kinds of grading, excavating and foundation work, excluding highway and railway work	397
Highway, city, county and state railroad-bed making, trenching and tunneling (excluding such work of this nature as is done by the regular "way-maintenance" crews of railroad companies)	971
Reclamation of marsh and arid lands, river dredging, harbor dredging and pile driving, but excluding dredging for precious metals	357
All forms of general construction. This will include all forms of superstructure work of wood, brick, stone, and concrete, excepting all structural steel work, bridge work, steeplejack and stack painting	5,451
Structural steel, bridge work, steeple and stack work	203
All work of finishing and equipping of structures, etc., such as plastering, painting, plumbing, decorating, electric wiring, tile and marble work, installing of boilers, furnaces and machinery	1,293
Ship building	215
Surveyors, mining engineers, etc. (This class is the same as "Civil engineers, surveyors, etc.," in the classification "Service")	7
Bill posting and scene painting	19
Total	9,000



MINING, QUARRYING AND OIL PRODUCTION

7849 ACCIDENTS CHARTED BY CAUSES AND COSTS.

TOTAL COST $141,218.17

A STUDY OF 7,849 ACCIDENTS OCCURRING IN MINES, QUARRIES AND OIL FIELDS.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	573
Dangerous substances	1,401
Falling objects	3,212
Tools	672
Animals	111
Collisions	668
Personal falls	837
All others	302
Unknown	73
Total	7,849

A STUDY OF 7,849 ACCIDENTS OCCURRING IN MINES, QUARRIES AND OIL FIELDS.

Time: 12 months—January 1 to December 31, 1914.

Time Lost in Days by Chief Causes.

Machinery	7,991
Dangerous substances	9,258
Falling objects	26,955
Tools	4,596
Animals	1,632
Collisions	7,999
Personal falls	12,788
All others	3,520
Unknown	511
Total	75,250

A STUDY OF 7,849 ACCIDENTS OCCURRING IN MINES, QUARRIES AND OIL FIELDS.

Time: 12 months—January 1 to December 31, 1914.

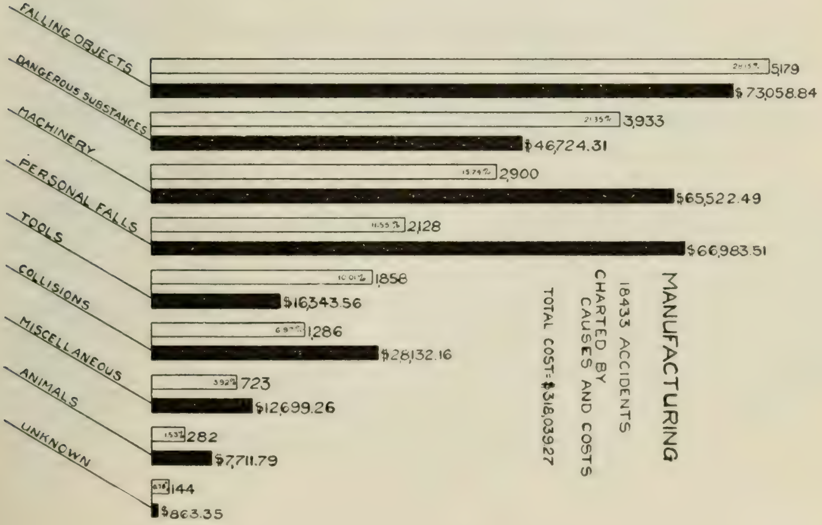
Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$8,647 00	$9,584 32	$18,231 32
Dangerous substances	6,379 00	11,215 96	17,594 96
Falling objects	23,842 00	20,197 61	44,039 61
Tools	2,653 00	3,855 48	6,508 48
Animals	1,797 00	2,635 31	4,432 31
Collision	6,448 00	7,652 52	14,100 52
Personal falls	14,016 00	13,179 32	27,195 32
All others	2,766 00	3,343 75	6,109 75
Unknown	1,582 00	1,423 90	3,005 90
Totals	$68,130 00	$73,088 17	$141,218 17

A STUDY OF 7,849 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

Extraction of raw materials from earth.	
Underground mining of—	
Gold and silver	1,986
Copper	384
Lead and zinc	4
Quicksilver	65
Iron (pyrites, etc.)	5
Magnesite and tungsten	17
Coal	10
Gypsum	6
Surface mining—	
Placer mining of all metals. Where individual metal groups become large enough, they may receive sub-numbers	4
All hydraulic mining	7
Dredging for mineral, only	335
Borax and salt	46
All metallurgical plants, including small smelters and refiners at or near the mines	38
All shop and power plant work around mines	1
Quarrying of—	
Building stone	105
Cement and lime rock	1,330
Sand, gravel and rock	207
Clay	2
Stone crushing, mortar mixing and preparation of roadbed materials (*see, also,* Manufacturing)	48
Oil production in all its branches except refining of lubricating oil, etc.	3,021
Unknown	228
Total	7,849



A STUDY OF 18,433 MANUFACTURING ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	2,900
Dangerous substances	3,933
Falling objects	5,179
Tools	1,858
Animals	282
Collisions	1,286
Personal falls	2,128
All others	723
Unknown	144
Total	18,433

18,433 MANUFACTURING ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Time Lost in Days by Chief Causes.

Machinery	34,657
Dangerous substances	27,445
Falling objects	45,523
Tools	12,489
Animals	3,720
Collisions	15,577
Personal falls	35,487
All others	8,809
Unknown	771
Total	184,478

18,433 MANUFACTURING ACCIDENTS.

Time: 12 months—January 1 to December 31, 1914.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

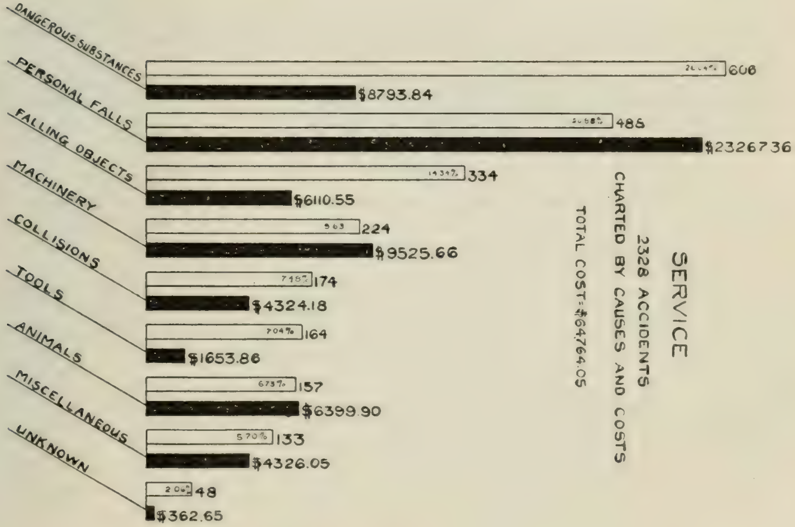
Cause	Compensation	Medical benefits	Total
Machinery	$31,912 00	$33,610 49	$65,522 49
Dangerous substances	15,990 00	30,734 31	46,724 31
Falling objects	37,679 00	35,379 84	73,058 84
Tools	5,374 00	10,969 56	16,343 56
Animals	3,197 00	4,514 79	7,711 79
Collisions	13,501 00	14,631 16	28,132 16
Personal falls	35,848 00	31,135 01	66,983 51
All others	5,275 00	7,424 26	12,699 26
Unknown	297 00	566 35	863 35
Totals	$149,073 00	$168,965 77	$318,039 27

A STUDY OF 18,433 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

Manufacturing.

Stone and earth products	375
Raw metals in blast furnaces or by founding and smelting or rolling all rough preparation of metals	665
Machine manufacture, manufacture of tools, instruments and the fashioning of any metals requiring special tools, machines and skill	4,580
All metal or metal-wood assembling. (Fixed tools and semi-skilled labor.) Machine repairing, overhauling, etc., including garages	710
Lumbering, felling and milling of trees	4,564
All wood working and cabinet making, including vehicles of both wood and wood-metal	359
Tanning and manufacture of leathers and leather goods	238
Rubber manufacture and all composition goods, etc.	83
Chemicals and allied products	153
Paper and all paper products	321
Printing, publishing and binding	368
Textiles	115
Non-textiled clothing and all furnishings for wear	243
Food, beverages, tobacco, drugs, etc.	4,764
Miscellaneous manufacture	75
Automobiles	402
Explosives	70
Paints, glass and oil	251
Soaps	42
Ropes and cordage	19
Oil refining	28
Unknown	8
Total	18,433



A STUDY OF 2,328 ACCIDENTS OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	224
Dangerous substances	606
Falling objects	334
Tools	164
Animals	157
Collisions	174
Personal falls	488
All others	133
Unknown	48
Total	2,328

A STUDY OF 2,328 ACCIDENTS OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Time: 12 months—January 1 to December 31, 1914.

Time Lost in Days by Chief Causes.

Machinery	3,969
Dangerous substances	4,716
Falling objects	3,469
Tools	1,198
Animals	2,275
Collisions	1,865
Personal falls	9,608
All others	2,374
Unknown	225
Total	29,699

A STUDY OF 2,328 ACCIDENTS OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Time: 12 months—January 1 to December 31, 1914.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

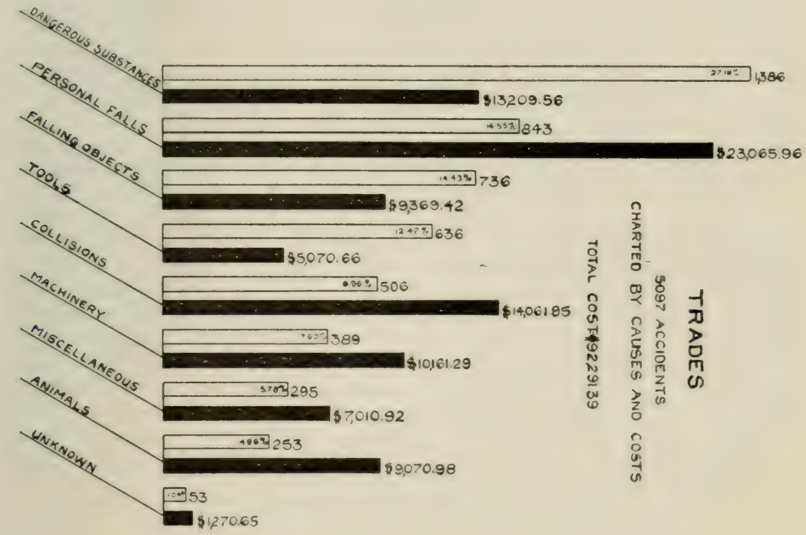
Cause	Compensation	Medical benefits	Total
Machinery	$4,370 00	$5,155 66	$9,525 66
Dangerous substances	2,780 00	6,013 84	8,793 84
Falling objects	2,914 00	3,196 55	6,110 55
Tools	755 00	898 86	1,653 86
Animals	2,592 00	3,807 90	6,399 90
Collisions	1,634 00	2,690 18	4,324 18
Personal falls	11,355 00	11,912 36	23,267 36
All others	1,395 00	2,931 05	4,326 05
Unknown	98 00	264 65	362 65
Totals	$27,893 00	$36,871 05	$64,764 05

A STUDY OF 2,328 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

Service.

Real estate, where no construction is done. Banks, insurance and loan companies, brokerage of all kinds	158
Hotels, apartments, houses, office buildings, clubs and resorts	441
Hospitals	51
Janitor service and window cleaning associations, street sweeping service (by private parties), etc.	17
Laundries and cleaning establishments	301
Military associations, etc.	2
Professional, including doctors, dentists, undertakers, barbers, manicures and hairdressers and all ministering to the human body	24
Architects, lawyers, public stenographers, agencies of all kinds and all places where the only hazard is clerical in nature	22
Domestic service (house servants, gardeners, etc.)	89
Schools and churches, libraries, observatories, and educational and charitable institutions of all kinds	124
Sports and amusements	1,044
Private police and detective agencies	6
Private fire protection (underwriters, etc.)	5
Trade and press and kindred associations	5
Cemeteries, crematories, etc.	24
Veterinaries, dog and animal pounds, dog and animal hospitals, etc.	4
Artists, photographers, etc.	2
Chemists—professional service	6
Civil engineers, surveyors, mining engineers, etc.	3
Total	2,328



A STUDY OF 5,097 ACCIDENTS OCCURRING IN MERCANTILE TRADES.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	389
Dangerous substances	1,386
Falling objects	736
Tools	636
Animals	253
Collisions	506
Personal falls	843
All others	295
Unknown	53
Total	5,097

5,097 ACCIDENTS OCCURRING IN MERCANTILE TRADES.

Time: 12 months—January 1 to December 31, 1914.

Time Lost in Days by Chief Causes.

Machinery	4,903
Dangerous substances	7,480
Falling objects	5,679
Tools	3,306
Animals	4,887
Collisions	7,181
Personal falls	12,756
All others	4,029
Unknown	532
Total	50,753

5,097 ACCIDENTS OCCURRING IN MERCANTILE TRADES.

Time: 12 months—January 1 to December 31, 1914.

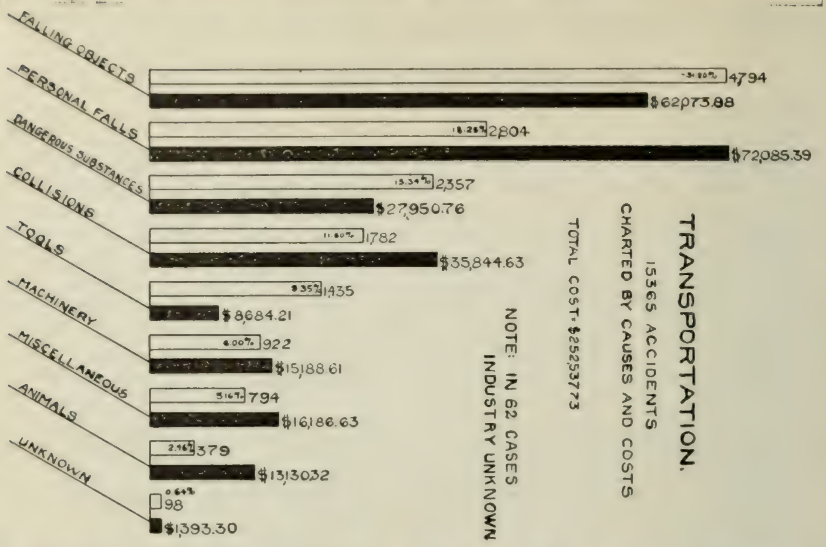
Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$4,466 00	$5,695 29	$10,161 29
Dangerous substances	3,156 00	10,053 56	13,209 56
Falling objects	3,648 00	5,721 42	9,369 42
Tools	1,079 00	3,991 66	5,070 66
Animals	4,350 00	4,720 98	9,070 98
Collisions	5,301 00	8,760 95	14,061 95
Personal falls	11,090 00	11,975 96	23,065 96
All others	2,471 00	4,539 92	7,010 92
Unknown	620 00	650 65	1,270 65
Totals	$36,181 00	$56,110 39	$92,291 39

A STUDY OF 5,097 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

Mercantile trades.	
Wholesale—	
Machinery of all kinds and its parts, including farm vehicles and implements, builders' hardware, belting, plumbers' supplies, stores, rubber goods, etc.	190
Light hardware, crockery, wooden and willow ware, trunks, leather goods, etc.	36
Furniture, pianos, carpets, bedding, household furnishings, including bar fixtures and supplies	17
Dry goods, clothing, shoes, hats and all wearing apparel	48
Foodstuffs, including groceries, produce and commission houses, tobacco and cigars, drugs, wines and liquors. (For slaughtering and fishing and cleaning, *see* "Manufacturing")	360
Hay, grain, coal, wood, fuel and feed, building material of all kinds	60
Paints, oils, glass and wall-paper, etc.	51
Scrap iron, bottle yards, junk dealers, etc.	37
Physicians' and dentists' supplies, drawing instruments and supplies, photographic sundries, etc., jewelers and opticians	18
Paper and bags, stationery and all paper products, notions and toys, etc.	27
Miscellaneous	18
Retail—	
Machinery and its parts, oil well supplies, ship chandlers, farm implements and vehicles	84
Automobile accessories, motorcycles and bicycles, sporting goods, firearms, etc.	50
Light hardware, household goods, crockery and glassware, lighting fixtures, art goods, typewriters and adding machines, etc.	251
Furniture, pianos, carpets, bedding, sewing machines, trunks and leather goods	174
Dry goods, clothing stores, wearing apparel of all kinds, general merchandise stores, department stores	1,602
Foodstuffs, groceries, wines and liquors, drugs, milk and ice delivery, candy and ice cream stores, delicatessen (excluding butcher shops, etc.)	861
Butcher shops, fish and oyster stalls and poultry stands	408
Paints and oils, glass and glaziers, wall-paper, etc.	22
News agents, paper carriers, etc., books and stationery, sheet music	28
Restaurants, cafeterias, caterers and commissaries, etc. (For hotel dining-rooms, *see* "Service")	406
Hay and grain, coal and wood, feed and fuel yards, lumber and building materials	286
Opticians, jewelers, etc.	18
Horse markets and all trading in live stock where dealers do not do the breeding and raising	10
Florists, etc.	6
Unknown	29
Total	5,097



A STUDY OF 15,365 ACCIDENTS ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO ACCIDENTS OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Time: 12 months—January 1 to December 31, 1914.

Chief Causes.

Machinery	922
Dangerous substances	2,357
Falling objects	4,794
Tools	1,435
Animals	379
Collisions	1,782
Personal falls	2,804
All others	794
Unknown	98
Total	15,365

A STUDY OF 15,365 ACCIDENTS ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO ACCIDENTS OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Time: 12 months—January 1 to December 31, 1914.

Time Lost in Days by Chief Causes.

Machinery	10,561
Dangerous substances	18,962
Falling objects	53,413
Tools	10,296
Animals	6,614
Collisions	27,716
Personal falls	51,130
All others	13,032
Unknown	1,244
Total	192,968

A STUDY OF 15,365 ACCIDENTS ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO ACCIDENTS OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Time: 12 months—January 1 to December 31, 1914.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$8,555 00	$6,633 61	$15,188 61
Dangerous substances	13,901 00	14,049 76	27,950 76
Falling objects	35,174 00	26,899 88	62,073 88
Tools	3,862 00	4,822 21	8,684 21
Animals	5,842 00	7,288 32	13,130 32
Collisions	20,208 00	15,636 63	35,844 63
Personal falls	45,212 00	26,873 39	72,085 39
All others	9,230 00	6,956 63	16,186 63
Unknown	677 00	716 30	1,393 30
Totals	$142,661 00	$109,876 73	$252,537 73

A STUDY OF 15,365 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

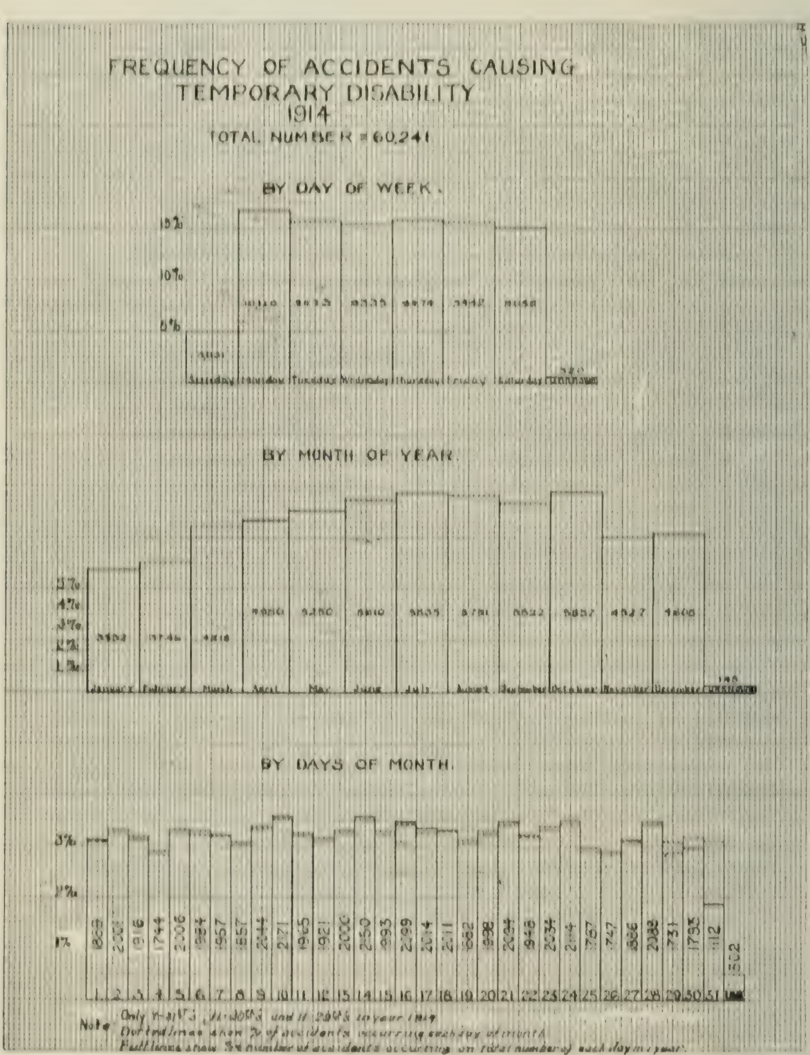
Transportation and public utilities.

Transportation—	
Cartage and storage, taxicab service, livery stables	1,068
Express companies (as Wells Fargo & Co.)	211
Pipe lines	180
Railroad auxiliaries (sleeping car service, dining car service, Pacific Fruit Express, oil tank lines, etc.)	491
Cable railways	12
Electric railways—street, interurban, etc.	1,483
Steam railroads	7,300
Stage lines	7
Steamships, water transportation of all kinds	611
Stevedoring	345
Warehousing (for household storage, *see* "Cartage and storage, taxicab service, livery stable")	166
Messenger service (other than telegraph companies)	10
Produce shippers, etc., such as vegetable shippers, etc., where there is no particular preparation of the article	18
Public utilities—	
Public corporations (city, county and state governments, including police, fire and water departments, clerical work, etc.; excluding highway and road work, which is under *Construction*, also hospitals and schools, which class under *Service*)	886
Electric light and power (not municipalities)	1,688
Gas works (not municipalities)	94
Incinerators (garbage and rubbish disposal)	20
Telegraph and telephones	524
Water works	247
Unknown	4
Total	15,365

A STUDY OF 62 TEMPORARY INJURIES GROUPED BY INDUSTRIES AND SUB-INDUSTRY.

Time: 12 months—January 1 to December 31, 1914.

Unknown industry.	
Unknown	62



60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Table Showing Industry by Day of Week.

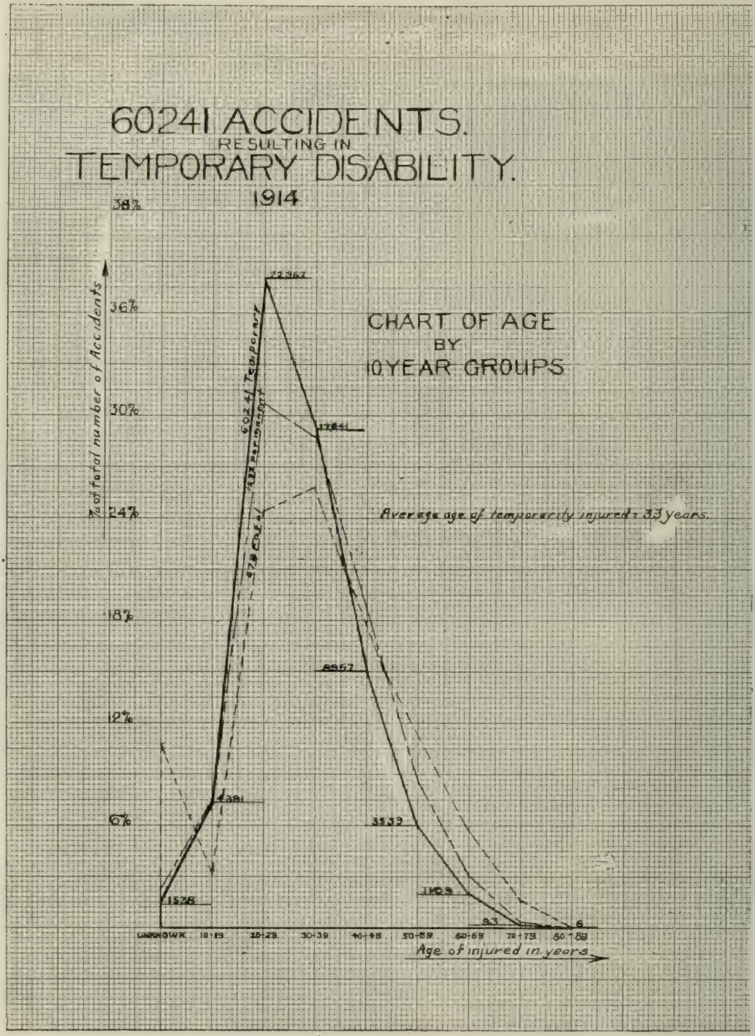
Industries	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Unknown	Total
Agriculture	144	356	306	298	303	317	352	31	2,107
Construction	408	1.568	1,421	1,496	1.436	1.417	1,267	47	9.000
Extraction	657	1,214	1,260	1.211	1.200	1,125	1.156	26	7.849
Manufacturing	620	3.108	2.952	2,864	3,026	2,959	2,814	90	18.433
Service	167	389	344	352	329	377	339	31	2.328
Trades	170	918	818	798	763	798	789	43	5.097
Transportation	863	2.548	2,360	2.365	2,409	2,437	2,332	51	15.365
Unknown	2	9	12	11	8	12	7	1	62
Totals	3,031	10,110	9.473	9.335	9.474	9.442	9,056	320	60,241

60.241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months. January 1 to December 31. 1914.

Table Showing Industry by Month of the Year.

Industries	January	February	March	April	May	June	July	August	September	October	November	December	Unknown	Total
Agriculture	73	89	149	118	178	219	256	241	189	246	192	149	8	2,107
Construction	470	546	742	786	901	833	810	861	811	884	728	618	10	9.000
Extraction	494	507	720	697	807	789	794	685	653	649	516	532	6	7.849
Manufacturing	1.077	1,064	1.365	1.523	1.552	1.833	1.921	1,932	1,758	1.770	1.260	1.347	31	18.433
Service	129	151	175	186	173	177	201	167	197	239	245	282	6	2.328
Trades	268	312	353	385	387	411	441	446	440	555	504	586	9	5.097
Transportation	1.041	1.077	1.314	1.285	1.272	1.348	1.412	1.459	1.474	1.514	1,082	1,094	13	15,365
Unknown	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	62	62
Totals	3.552	3,746	4.818	4.980	5.270	5,610	5,835	5.791	5.522	5.857	4.527	4.608	145	60.241


60241 ACCIDENTS.
RESULTING IN
TEMPORARY DISABILITY.
1914
CHART OF AGE
BY
10 YEAR GROUPS
% of total number of Accidents
38%
36%
30%
24%
18%
12%
6%
22367
17841
8957
4381
3539
1576
1109
93
6
60241 Temporary
Average age of temporarily injured = 33 years.
UNKNOWN
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
Age of injured in years

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Distribution by Industries and Ten-Year Age Groups.

Industries	AGE GROUPS									
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Unknown	Total
Agriculture	147	698	531	353	183	99	7	2	87	2,107
Construction	306	2,875	2,899	1,645	687	200	10	------------	378	9,000
Extraction	199	3,337	2,555	1,156	403	83	8	------------	108	7,849
Manufacturing	2,059	7,346	4,917	2,385	978	342	25	2	379	18,433
Service	156	863	589	361	169	47	15	------------	128	2,328
Trades	953	1,891	1,171	565	262	80	7	1	162	5,097
Transportation	561	5,942	4,968	2,480	847	257	21	------------	289	15,365
Unknown	5	15	11	12	10	1	------------	1	7	62
Totals	4,391	22,967	17,641	8,957	3,539	1,109	93	6	1,538	60,241

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Table Showing Cause of Injury by Age (Ten-Year Groups).

Cause	AGE GROUPS									
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Unknown	Total
Machinery	744	2,383	1,556	672	226	68	4	------------	99	5,752
Dangerous substances	1,215	4,892	3,463	1,511	555	136	15	------------	274	12,059
Falling objects	785	6,369	5,062	3,030	1,122	256	24	2	476	17,126
Tools	506	2,365	1,666	740	266	75	5	------------	108	5,731
Animals	103	691	556	321	153	52	11	1	55	1,943
Collisions	421	2,014	1,538	702	294	112	10	------------	117	5,208
Personal falls	465	3,076	2,808	1,454	710	356	21	3	223	9,116
All others	124	989	847	466	196	48	4	------------	68	2,742
Unknown	28	188	145	61	17	6	1	------------	118	564
Totals	4,391	22,967	17,641	8,957	3,539	1,109	93	6	1,538	60,241

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Table Showing Cause of Injury, by Nativity.

Cause	American	Foreign	Unknown	Total
Machinery	3,978	1,717	57	5,752
Dangerous substances	8,209	3,750	100	12,059
Falling objects	9,875	7,143	108	17,126
Tools	3,741	1,964	26	5,731
Animals	1,418	498	27	1,943
Collisions	3,380	1,789	39	5,208
Falls	6,268	2,778	70	9,116
All others	1,902	810	30	2,742
Unknown	223	181	160	564
Totals	38,994	20,630	617	60,241

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Table Showing Nativity and Industries in Which They Occurred.

Industries	American	Foreign	Unknown	Total
Agriculture	1,456	621	30	2,107
Construction	5,827	3,058	115	9,000
Extraction of raw materials	4,742	3,072	35	7,849
Manufacturing	11,397	6,889	147	18,433
Service	1,652	615	61	2,328
Trades	3,864	1,178	55	5,097
Transportation	10,056	5,197	112	15,365
Industries unknown			62	62
Totals	38,994	20,630	617	60,241

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Tables of Nativity and Conjugal Condition.

Nativity.

American	38,994
Foreign	20,630
Unknown	617
Total	60,241

Conjugal Condition.

Married	27,874
Single	30,220
Unknown	2,147
Total	60,241

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.	
Bruises, contusions and abrasions	15,985
Cuts and lacerations	14,949
Dislocations, sprains and strains	7,046
Fractures of all kinds	2,980
Burns and scalds	2,920
Mashes, crushes—no permanent injuries	2,872
Infections	2,602
Injuries to eyes	4,723
Puncture wounds	4,588
Internal injuries	188
Ruptures—hernia	484
Poisonings—including poison oak, lead poisoning, etc.	75
Concussion of the brain	56
Injury to spine	30
Loss of teeth	75
Overcome by gas	37
Sunstroke—overcome with heat	57
Water on the knee	12
Electric shock	16
Paralysis	20
Erysipelas	13
Injury to ears—deafness	48
Exposure—resulting in diseases	11
Photophobia	5
Epilepsy	1
Varicose	3
Rupture of blood vessels	23
Bullet wounds	63
Fainting—exhaustion	9
General injuries to body	39
Pneumothorax	13
Irritation from cement dust	4
Swallowing pins, tacks, etc.	8
Constitutional disorders arising from processes	12
Constitutional disorders arising from accidents	8
Blisters on hands and feet from constant rubbings, etc.	3
Unknown	263
Total	60,241

A DETAILED STUDY OF 5,752 MACHINE ACCIDENTS BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.

Bruises, contusions and abrasions	1,585
Cuts and lacerations	2,359
Dislocations, sprains and strains	348
Fractures of all kinds	498
Burns and scalds	54
Mashes, crushes—no permanent injuries	589
Infections	104
Injuries to eyes	22
Puncture wounds	130
Internal injuries	11
Ruptures—hernia	10
Concussion of the brain	5
Injury to spine	2
Loss of teeth	9
Overcome by gas	1
Water on knee	1
Electric shock	1
Paralysis	3
Erysipelas	1
Fainting—exhaustion	1
General injuries to body	2
Pneumothorax	2
Constitutional disorders arising from processes	1
Constitutional disorders arising from accidents	2
Unknown	11
Total	5,752

A DETAILED STUDY OF 12,059 ACCIDENTS RESULTING FROM CONTACT WITH DANGEROUS SUBSTANCES, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.

Bruises, contusions and abrasions	255
Cuts and lacerations	2.834
Dislocations, sprains and strains	47
Fractures of all kinds	20
Burns and scalds	2,734
Mashes, crushes—no permanent injuries	12
Infections	1.444
Injuries to eyes	781
Puncture wounds	3,721
Internal injuries	7
Ruptures—hernia	1
Poisonings—including poison oak, lead poisoning, etc.	51
Overcome by gas	22
Sunstroke—overcome with heat	26
Electric shock	15
Paralysis	1
Erysipelas	2
Injury to ears—deafness	36
Exposure—resulting in diseases	5
Photophobia	4
Rupture of blood vessels	1
Bullet wounds	8
Fainting—exhaustion	3
General injuries to body	6
Pneumothorax	4
Irritation from cement dust	4
Swallowing pins, tacks, etc.	8
Constitutional disorders arising from processes	4
Constitutional disorders arising from accidents	1
Unknown	5
Total	12.059

A DETAILED STUDY OF 17,126 ACCIDENTS RESULTING FROM FALLING, ROLLING AND FLYING OBJECTS, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.	
Bruises, contusions and abrasions	6,104
Cuts and lacerations	3,680
Dislocations, sprains and strains	664
Fractures of all kinds	868
Burns and scalds	51
Mashes, crushes—no permanent injuries	1,327
Infections	303
Injuries to eyes	3,798
Puncture wounds	214
Internal injuries	24
Ruptures—hernia	12
Poisonings—including poison oak, lead poisoning, etc.	1
Concussion of the brain	19
Injury to spine	4
Loss of teeth	18
Water on knee	2
Paralysis	3
Erysipelas	6
Injury to ears—deafness	3
Rupture of blood vessels	1
Fainting—exhaustion	1
General injuries to body	3
Unknown	20
Total	17,126

A DETAILED STUDY OF 5,731 ACCIDENTS RESULTING FROM TOOLS, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.	
Bruises, contusions and abrasions	1,515
Cuts and lacerations	2,925
Dislocations, sprains and strains	113
Fractures of all kinds	108
Burns and scalds	9
Mashes, crushes—no permanent injuries	281
Infections	303
Injuries to eyes	52
Puncture wounds	375
Internal injuries	4
Ruptures—hernia	8
Poisonings—including poison oak, lead poisoning, etc.	2
Concussion of the brain	1
Injury to spine	1
Loss of teeth	17
Water on the knee	2
Paralysis	2
Injury to ears—deafness	1
Varicose	1
Rupture of blood vessels	3
Blisters on hands and feet from constant rubbing, etc.	2
Unknown	6
Total	5,731

A DETAILED STUDY OF 1,943 ACCIDENTS RESULTING FROM ANIMALS, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.

Bruises, contusions and abrasions	804
Cuts and lacerations	355
Dislocations, sprains and strains	214
Fractures of all kinds	313
Burns and scalds	6
Mashes, crushes—no permanent injuries	41
Infections	62
Injuries to eyes	18
Puncture wounds	64
Internal injuries	16
Ruptures—hernia	8
Poisonings—including poison oak, lead poisoning, etc.	15
Concussion of the brain	3
Loss of teeth	6
Injury to ears—deafness	1
Pneumothorax	2
Constitutional disorders arising from accidents	1
Unknown	14
Total	1,943

A DETAILED STUDY OF 5,208 ACCIDENTS RESULTING FROM COLLISIONS, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.

Bruises, contusions and abrasions	2,353
Cuts and lacerations	1,117
Dislocations, sprains and strains	478
Fractures of all kinds	422
Burns and scalds	14
Mashes, crushes—no permanent injuries	554
Infections	156
Injuries to eyes	17
Puncture wounds	14
Internal injuries	18
Ruptures—hernia	7
Poisonings—including poison oak, lead poisoning, etc.	1
Concussion of the brain	8
Injury to spine	4
Loss of teeth	5
Water on the knee	1
Paralysis	2
Erysipelas	1
Injury to ears—deafness	3
Varicose	1
Rupture of blood vessels	4
Fainting—exhaustion	1
General injuries to body	10
Constitutional disorders arising from accidents	1
Unknown	16
Total	5,208

A DETAILED STUDY OF 9,116 ACCIDENTS RESULTING IN PERSONAL FALLS, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.	
Bruises, contusions and abrasions	3,134
Cuts and lacerations	1,561
Dislocations, sprains and strains	3,143
Fractures of all kinds	710
Burns and scalds	38
Mashes, crushes—no permanent injuries	52
Infections	84
Injuries to eyes	11
Puncture wounds	59
Internal injuries	87
Ruptures—hernia	91
Poisonings—including poison oak, lead poisoning, etc.	1
Concussion of the brain	19
Injury to spine	19
Loss of teeth	17
Overcome by gas	1
Sunstroke—overcome with heat	1
Water on the knee	4
Paralysis	7
Erysipelas	2
Injury to ears—deafness	3
Exposure—resulting in diseases	2
Varicose	1
Rupture of blood vessels	5
Bullet wounds	1
Fainting—exhaustion	2
General injuries to body	17
Pneumothorax	8
Constitutional disorders arising from accidents	3
Unknown	33
Total	9,116

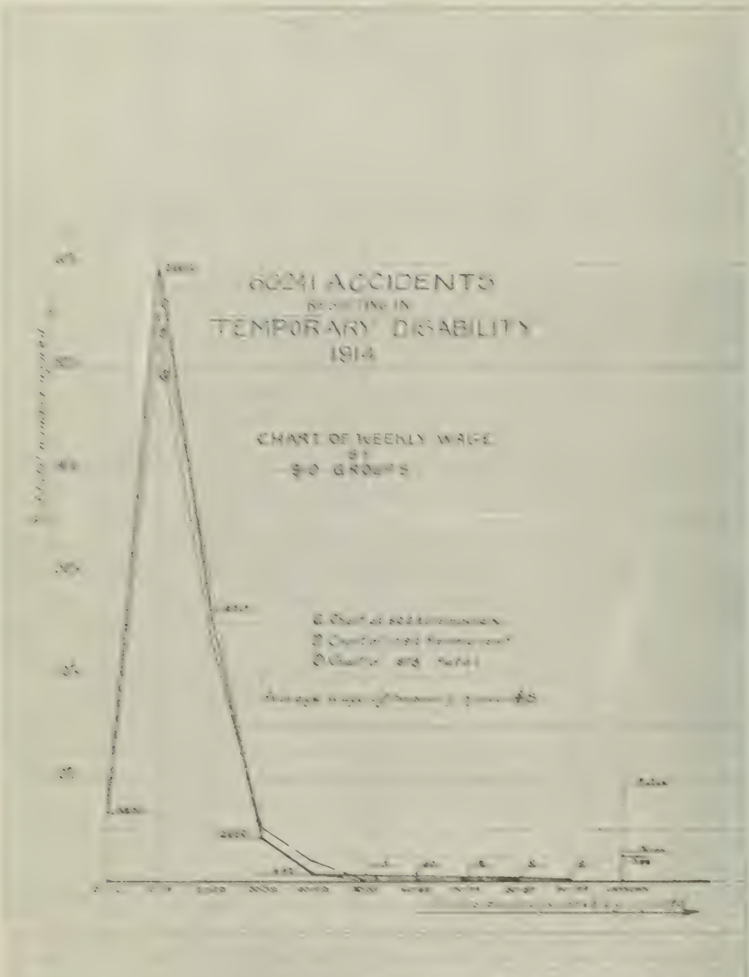
A DETAILED STUDY OF 2,742 ACCIDENTS RESULTING FROM ALL OTHER CAUSES, BY NATURE OF INJURY.

Time: 12 months—January 1 to December 31, 1914.

Nature of Injury.

Bruises, contusions and abrasions	158
Cuts and lacerations	40
Dislocations, sprains and strains	1,981
Fractures of all kinds	28
Burns and scalds	6
Mashes, crushes—no permanent injuries	5
Infections	31
Injuries to eyes	2
Puncture wounds	7
Internal injuries	21
Ruptures—hernia	331
Poisonings—including poison oak, lead poisoning, etc.	3
Concussion of the brain	1
Loss of teeth	1
Overcome by gas	13
Sunstroke—overcome with heat	28
Water on the knee	1
Paralysis	2
Erysipelas	1
Injury to ears—deafness	1
Exposure—resulting in diseases	4
Epilepsy	1
Rupture of blood vessels	8
Bullet wounds	54
Fainting—exhaustion	1
Constitutional disorders arising from processes	7
Blisters on hands and feet from constant rubbing, etc.	1
Unknown	5
Total	2,742
Accidents where the cause is unknown	564

(No distribution was made for nature of injury.)


6624 ACCIDENTS
RESULTING IN
TEMPORARY DISABILITY
1914
CHART OF WEEKLY WAGE
BY
$5 GROUPS

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Table Showing Industries by Conjugal Condition and by Nativity.

Industries	Married				Single				Unknown			
	American	Foreign	Unknown	Total	American	Foreign	Unknown	Total	American	Foreign	Unknown	Total
Agriculture	537	184	2	723	825	393	3	1,221	94	44	25	163
Construction	2,887	1,249	25	4,161	2,543	1,642	35	4,220	397	167	55	619
Extraction	2,199	1,245	8	3,452	2,474	1,789	11	4,274	69	38	16	123
Manufacturing	5,164	3,061	36	8,261	5,926	3,646	47	9,619	307	182	64	553
Service	808	276	12	1,096	735	311	14	1,060	109	28	35	172
Trades	1,489	504	16	2,009	2,265	638	16	2,919	110	36	23	169
Transportation	5,674	2,469	29	8,172	4,234	2,643	30	6,907	148	85	53	286
Unknown											62	62
Totals	18,758	8,988	128	27,874	19,002	11,062	156	30,220	1,234	580	333	2,147

Grand total, 60,241 cases.

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Distribution by Industries and Ten-Dollar Wage Groups.

Industries	WAGE GROUPS											
	Under $10	$10-$19	$20-$29	$30-$39	$40-49	$50-$59	$60-$69	$70-$79	$80-$89	$90-$99	Unknown	Total
Agriculture	300	1,407	208	32	8	3					149	2,107
Construction	130	4,920	2,683	869	100	12	4	1	1	1	279	9,000
Extraction	65	4,520	2,674	363	127	20	2	3	1	1	73	7,849
Manufacturing	1,384	11,542	4,460	596	76	35	12	4		1	323	18,133
Service	238	1,213	514	122	38	15	10	4	5	4	165	2,328
Trades	977	2,879	913	117	22	9	4	2		1	173	5,097
Transportation	886	9,161	4,448	548	76	19	8	2	2	1	214	15,365
Unknown	5	30	14	3							10	62
Totals	3,985	35,672	15,914	2,650	447	113	40	16	9	9	1,386	60,241

60,241 ACCIDENTS RESULTING IN TEMPORARY INJURY.

Time: 12 months—January 1 to December 31, 1914.

Table Showing Part of Body Injured.

Head, neck or face	5,795
Eye injuries, either left, right or both eyes	5,231
Trunk, chest, back or abdomen	6,038
Right arm, left arm, or both arms (excluding hands)	2,704
Right hand, left hand, or both hands	6,429
Fingers and thumb, either right, left or both	13,212
Legs, upper and lower, either right, left or both	4,201
Feet and toes, either right, left or both feet	7,833
Internal injuries	193
Hernia	430
Elbow or wrist, either right, left or both	2,215
Knee or ankle, either right, left or both	3,727
Injuries to one or both shoulders	1,082
Bullet wounds and general injuries to the body	777
Exhaustion, sunstroke, etc.	109
Unknown	265
Total	60,241

STATEMENT OF CALIFORNIA'S ACCIDENT EXPERIENCE FOR THE FISCAL YEAR, JULY, 1914, TO JUNE 30, 1915; ALSO A STATEMENT OF THE ACCIDENT EXPERIENCE FOR THE FIRST SIX MONTHS OF 1915.

Fiscal Year, July 1, 1914, to June 30, 1915.

Total number of accidents reported		60,737
Fatal accidents	582	
Permanent injuries	987	
Temporary injuries	59,168	
Total amount of compensation reported paid during fiscal year was about		$1,600,000 00

First Six Months of 1915.

Total number of accidents reported		29,081
Fatal accidents	217	
Permanent injuries	334	
Temporary injuries	28,530	
The amount of compensation reported paid during the first six months of 1915 was about		$750,000 00

NOTE.—Attention is called to the fact that these last mentioned figures are subject to revision, as later advice will be received from the insurance companies regarding additional payments.

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INDUSTRIAL ACCIDENT COMMISSION
OF THE
STATE OF CALIFORNIA

REPORT
OF THE
Industrial Accident Commission
OF THE
State of California

From July 1, 1915, to June 30, 1916

COMMISSIONERS:
A. J. PILLSBURY, Chairman.
WILL J. FRENCH MEYER LISSNER

525 MARKET STREET
SAN FRANCISCO

26438

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REPORT OF THE INDUSTRIAL ACCIDENT COMMISSION FROM JULY 1, 1915, TO JUNE 30, 1916.

HON. HIRAM W. JOHNSON,
Governor of California.

DEAR SIR: In obedience to the requirements of section 88 of the Workmen's Compensation, Insurance and Safety Act, we herewith submit a report of the work of the Industrial Accident Commission for the period, July 1, 1915, to June 30, 1916, inclusive. The report for the year gives not only a recital of the work of the Industrial Accident Commission in its various departments, but also a brief review of the rulings of the Supreme Court of the state upon questions which arose in cases taken up on writs of review.

Organization of the Commission.

The Industrial Accident Commission during the year consisted of the following members: A. J. Pillsbury, chairman; Will J. French, vice chairman; Harris Weinstock, member (to November 11, 1915); Meyer Lissner, member (from November 11, 1915). The persons whose names are appended had supervision of the various departments of the Commission during the year: H. L. White, secretary; J. S. Thomas, assistant secretary; H. H. Kinney, secretary Los Angeles Branch; Christopher M. Bradley, attorney; F. B. Lord, manager Compensation Department; Dr. Morton R. Gibbons, medical director; C. W. Fellows, manager of State Compensation Insurance Fund; John R. Brownell, superintendent of safety; H. M. Wolflin, mines inspector (to January 1, 1916); Edwin Higgins, mines inspector (from January 1, 1916); C. B. Hensley, statistician; Monroe C. Kidder, superintendent of the Permanent Disability Rating Department.

The principal offices of the Commission are located in the Underwood Building, 525 Market street, San Francisco. A branch office, for the convenience of residents of the southern portion of the state, is located in the Union League Building, Los Angeles.

Compensation Act Still Growing in Favor.

In our last annual report, we called attention to the fact that the jurisdiction of the Commission had been extended by the filing of voluntary acceptances by 6,858 employers to cover classes of labor specifically exempted under section 14 of the Act. During the year from July 1, 1915, to June 30, 1916, this number was increased to 17,891 (showing a gain of 11,033), distributed as follows: Farming and kindred occupations, 10,397; domestic, 1,139; casual, 6,252; unclassified, 103.

The attitude of employers of farm and kindred labor, indicated by the filing of these acceptances, is both gratifying and significant. The United States census for 1910 showed that there were in this state 88,197 farmers who either owned or operated land. Of this number 10,593 operated farms of nine acres or less, and probably were not employers of labor, while the remaining 77,599 can reasonably be presumed to be employers. The 10,397 farmers who have elected to come under the law represent approximately 14 per cent of the whole number of employers who were engaged in the occupation of farming in this state at the time the last census was taken. The rapid increase would seem to indicate, therefore, that the Act is being received with increasing favor and that there is ground for the belief that the time is not far distant when farming may be eliminated from the exempting clause of the Act.

Expenses From July 1, 1915, to June 30, 1916.

Salaries of three commissioners	$14,958 35
San Francisco Office.	
Salaries	$105,734 91
Office expense	3,825 81
General expense	3,646 52
Postage	3,373 59
Telephone and telegrams	1,431 56
Express	594 47
Stationery and printing	10,634 94
Rent	10,504 32
Traveling expenses	12,851 00
Library	310 86
Furniture and fixtures	3,928 16
Medical referees	2,397 70
Referee's hearings	2,456 25
Cost and maintenance of automobiles	6,991,39
Los Angeles Office.	
Salaries	$18,585 05
Office expense	863 56
General expense	95 83
Postage	310 08
Telephone and telegrams	762 04
Express	52 45
Stationery and printing	67 88
Rent	3,218 00
Traveling expenses	1,573 01
Library	35 00
Furniture and fixtures	1,903 80
Cost and maintenance of automobile	1,084 29
Total	$212,190 82
Less collections, fees and refunds	6,287 22
	$205,903 60

DECISIONS OF THE SUPREME COURT AND DISTRICT COURTS OF APPEAL.

The year covered by this report has been fruitful in important decisions by courts of last resort in California, passing upon the validity of the statute, which has been attacked from many sides by litigants alleging its unconstitutionality, and, also, passing upon questions of statutory construction having a vital bearing.

It is gratifying to be able to report that the Supreme Court has established the validity of the statute as against attacks made upon it which, if successful, would have defeated the entire compensation plan. If the principle of compulsory compensation for industrial injury and death had been held to be violative of the federal and state constitutional provisions enjoining due process of law, or violative of the federal constitutional inhibition against the denial of equal protection of the laws, or the state provisions against special legislation, the result would have been to nullify all that has been done to establish and maintain a thoroughgoing compensation system in California. However, a divided court has found full sanction for the statute, under these heads, in the police power, and in the right and power of the legislature to classify occupations for the purposes of this kind of legislation. *Western Indemnity Co.* vs. *Industrial Accident Commission* (151 Pac. 398).

The case first decided, passing upon the constitutionality of the statute, was one involving injury only. There yet remained the question whether it was competent for the legislature to extend the statute to cover indemnity to dependents, both domestic and alien, where the injury resulted in death. It was strongly argued that no sanction could be found for such extension in view of the express provisions of section 21 of Article XX of the Constitution, which contained the following language:

> ''The Legislature may by appropriate legislation create and enforce a liability on the part of all employers to compensate their employees for any injury incurred by the said employees in the course of their employment, irrespective of the fault of either party.''

But in presenting constitutional questions to the court, and especially in searching for sanction for the legislation, the Commission saw fit to rely rather upon the general police power than upon the express language of the constitutional amendment, only using the amendment as having expressed, in general language, the policy of the people of the state to enable compensation legislation to be enacted. A divided court upheld the validity of the extension, by the Legislature, to cover death benefits to dependents of a workman fatally injured, and upheld the further extension for the benefit of alien dependents, both resident and nonresident. *Western Metal Supply Co.* vs. *Industrial Accident Commission* (51 Cal. Dec. 447).

While the court decisions have established the statute, and so have established the Commission on firm ground in the general administration of the law, this does not mean that other decisions of the Supreme Court have not hampered and restricted the application of the statute, and administration under it, so as to defeat, to an appreciable extent, the beneficent purposes of the legislation.

A recent decision of the court has placed a severe limitation upon the jurisdiction of the Industrial Accident Commission by holding that it can not settle a controversy between an employee of a subcontractor and a general contractor or owner, as provided in section 30 of the Compensation Statute. The court has not held that the Legislature may not fix an obligation against the general contractor or owner, who is not the immediate employer, but has held that the Commission has no jurisdiction to determine the controversy and make an award against parties secondarily liable. The court bases this decision upon a strict construction of section 21 Article XX of the Constitution, the first sentence of which defines the scope of the legislation, and the second sentence of which defines the investiture of jurisdiction. The court took the view that inasmuch as the liability was to be fixed against employers to compensate their employees, jurisdiction could be invested in the Commission to take cognizance only of a dispute between these immediate parties to the relation. The decision is a serious handicap in the administration of the statute, as it removes the protection, found to be very substantial, of insurance to employees and their dependents to secure to them the indemnities fixed by the law, either by making the party secondarily liable the insurer for his contractor, or giving him the greatest incentive to see that the one who undertakes to perform work for him provide insurance coverage for the men employed in the execution of the work. *Sturdivant* vs. *Industrial Accident Commission* (51. Cal. Dec. 573); *Carstens* vs. *Industrial Accident Commission* (51 Cal. Dec. 574).

If the cases last cited are carried to their logical conclusion the courts may hold that the Commission has no jurisdiction to entertain a case against a compensation insurance carrier, to construe its policy, or to make an award against it. The same result may be reached as to settling disputes in cases where there is involved a question between an employee and a physician or hospital which provided the treatment prescribed by law. It will be readily understood how seriously these restrictions will impair the efficient administration of the statute.

The courts have not yielded to exhaustive arguments and authorities to the effect that the Industrial Accident Commission is essentially an administrative body vested with incidental judicial attributes, to enable it to pursue a simple and efficient course of administrative work, which is necessarily incident to the expeditious and inexpensive application of the statute. On the contrary, the Supreme Court leans strongly toward the position that the Industrial Accident Commission is ''in legal effect'' a court, because it is invested with many of the formal functions of a judicial tribunal. The court has not yet held that the Commission is judicial to the extent of being a constitutional court, and, in that sense, a part and parcel of the judicial department of the state, which can not, as such, exercise other than judicial power. In the event the court should so hold it would seem that as the Workmen's Compensation, Insurance and Safety Act stands at present, two of its vital and essential constituents, insurance and safety, must fail for want of administration, because a pure court can not manage a great insurance business and can not supervise and regulate the vital matter of industrial safety. Any comprehensive system of compensation must carry, as essential compliments, a thoroughgoing safety program and provisions for insurance coverage and regulation. The three things, compensation, insurance and safety are so intimately related and so interwoven as parts of an adequate compensation system as to require intimate knowledge and close contact with all three departments of the work by the same administrative body to bring about the greatest measure of administrative economy and efficiency.

One of the defenses to a claim for indemnity is that the employee is chargeable with wilful misconduct, which the statute does not define. This defense was one of the first put forward before the Commission in a case of disputed liability. The defense was sustained. (Annual Report of the Industrial Accident Commission, 1914–1915, p. 8). This defense is becoming of more and more frequent occurrence in cases before the Commission. It usually involves the breach of a rule or a statute and is most frequently set up as a defense in cases of serious disablement or death. While the courts can not be said to look with favor upon this defense, the fact remains that it has been sustained in a number of cases annulling the awards of the Commission where great hardships have resulted. It was this same situation which was most strongly persuasive in influencing the British Parliament to change the British Workmen's Compensation statute to provide that wilful misconduct should not be a defense to a claim for indemnity where the injury resulted in death or serious permanent disablement.

Under the provisions of section 34 (*c*), 1 and 2 of the statute an employer may be relieved from liability and his insurance carrier substituted in his place by the giving of certain prescribed notices after the happening of the injury. The Supreme Court has held that the giving of the notice is effective to relieve the employer from liability even though the notice is given after the insolvency or failure of the insurance carrier. This decision overruled that of the Commission which had held that the notice must be given by, or to, an insurance carrier qualified to do business as such under the laws of this state, and that one which had had its license revoked did not bear the character of an insurance carrier which could give or receive the notice prescribed by the statute. The decision of the court was rendered in a test case arising out of the failure of the Commonwealth Bonding and Casualty Insurance Company of Fort Worth, Texas. There were a number of cases in which no notice had been given to effect the substitution of the insurance carrier prior to its failure and prior to the cancellation of its permit to do business in this state, but the notices given subsequently relieved the employers of liability and left the injured employees and their dependents without relief. *Weiser* vs. *Industrial Accident Commission* (51 Cal. Dec. 553).

There are three classes of cases involving jurisdictional questions pending before the Supreme Court for decision which have been a source of great difficulty in administering the statute. These are:

1. Cases of extraterritorial jurisdiction,
2. Railroad employees, and
3. Maritime employees.

1. The Commission has consistently held that the compensation statute extends to cover injuries and death suffered by employees without the physical boundaries of the state where the contract of hire is made within the state and the employee is a resident of the state. The Supreme Court sustained this view in a decision rendered March 31, 1916, *North Alaska Salmon Co.* vs. *Pillsbury et al.* (51 Cal. Dec. 473). The employee suffered an injury on a California ship while working in Alaskan waters. However, the decision has not become final for the reason that the court granted a petition for rehearing and the case is still pending.

2. There is the greatest confusion in the cases of employees injured in railroad work. Congress has enacted a negligence law applicable to the employees of railroads engaged in interstate commerce who suffer personal injury while employed in such commerce. It is contended that a compensation law can not operate in the field covered by Congress, that is, where an employee is injured while doing anything in connection with interstate commerce. The difficulty is to determine, in the most numerous classes of cases, whether or not the particular service in which the employee is engaged when he suffers injury is connected with, or colored by, employment in interstate commerce. Each case must be determined upon its own particular facts and the

courts are in great confusion with respect to what is and what is not, employment in interstate commerce. There are a number of cases pending for decision in the Supreme Court of the United States, decisions which may result in formulating some sort of a workable rule for commissions and courts. The only case decided by the Supreme Court of the state of California was one overruling the award made by this Commission. *Southern Pacific Co.* vs. *Industrial Accident Commission* (151 Pac. 277). In that case the deceased employee was a truck builder and repairer of trucks for locomotives. He worked in Roundhouse No. 1 of the Southern Pacific Company at Roseville. At the time of the accident which caused his death he was engaged in repairing a switch engine. The roundhouse was used for housing switch engines which were operated in the yards at Roseville Junction in handling both inter- and intrastate commerce. At the time of the accident the company was not using the switch engine in any kind of commerce. It had been withdrawn from service on January 13th, and was not returned to service until January 19, 1914, three days after the accident occurred. The Commission decided that the deceased was not engaged in any kind of commerce at the time of his death. The court held that he was employed in interstate commerce and annulled the award of the Commission.

3. The maritime cases, involving injuries to stevedores and sailors on California ships, in which the injuries occur on the navigable waters of the state, within the three-mile limit, on the high seas, in foreign waters and in foreign ports, make up another class of cases in which there is competing jurisdiction between the Commission and courts sitting in admiralty. The Commission has taken the position that its jurisdiction is concurrent with that of admiralty courts in all cases where the ship is a California ship owned in this state, and the injured or killed employee is a resident of this state. The Supreme Court has not yet decided any of the eight cases which have been taken up on writs of *certiorari*. The decisions of all state courts, except one, have uniformly sustained the position taken by the Commission. There are, at present, on appeal in the Supreme Court of the United States, two cases, from New York and Connecticut, decisions of which should go very far to clear up this important question of competing jurisdiction.

COMPENSATION DEPARTMENT.

Increase of Applications.

Why does the number of cases before the Commission increase and continue to increase?

In the five years the state has had a Compensation law, it would seem that the general public, the employers, the insurance companies and the wage earners of the state should have become, to a great extent, familiar with the principles of compensation and therefore able to settle most cases ''out of court''. We would expect to find a decrease rather than an increase of cases to be adjudicated by the Commission.

There is no doubt that many claims are now paid without question which would formerly have been disputed. Border-line cases there will always be, but the number of that class of cases should be about the same. The probability is that the increase comes from the spread of the knowledge of the law among the people. The wage earner has learned that he has certain rights under the law and that it is no longer useless for him to demand an enforcement of those rights. Under the old liability law, the cost of a suit made the law practically useless to the employee, especially in small claims.

Again, the employee in many cases clashed with his employer and the resulting antagonism often cost the workman his employment which was more valuable than all he could obtain from a suit. Today, that feeling is passing away. Familiarity with the Compensation Act and its working has changed the attitude of the employer very materially. He more generally believes that his men should be cared for and protected as well as his machinery and other equipment. In fact, compensation has taught that efficiency is increased because the employee feels that he will be cared for if injured.

These conditions are probably the chief reasons for the increase in the number of cases filed.

Time Consumed in the Adjustment of Cases.

Compensation is intended to be quick in action, so that the injured man may receive his money while he is disabled and most needs it. While over 90 per cent of the compensable injuries are not disputed, and are paid with little delay, the aim of the Commission is to give quick relief even in disputed cases. Every energy is, therefore, being exerted to shorten the time between the filing of the application and the decision. Postponements are refused for any except the most urgent reasons, and where further evidence is imperative, a definite time is given for its production.

The statement that the Commission has, during the past year, adjudicated 1,392 new cases and 510 supplementary proceedings perhaps best shows the great volume of work which passes before the Commission. Stated in another way, this means that the Commission has to hear, decide, and prepare the necessary papers in seven cases on each working day during the whole year. It was necessary, in order to decide 1,392 cases, to hold 1,577 hearings before either a Commissioner or a Referee. In addition, many hearings were necessary in order to dispose of 510 supplementary proceedings filed. To facilitate the decision of medical questions involved, 230 medical examinations were ordered on behalf of the Commission. Besides handling the cases, this department must keep files and records of all notices of assumption of liability sent in by insurance carriers and employers. These notices are filed in order that employers may be relieved from liability and their insurance carriers substituted in their places. Many appointments of guardians and trustees for minors and incompetents are made in order that payment of compensation may be made for injuries where there is no dispute and no need of adjustment of claim, but where it is necessary to have someone authorized to receive payments. Acceptances of the Compensation Act by employers who were without the jurisdiction of the Commission were filed in the past year to the number of 11,033.

For the past year the ordinary time in an ordinary case between the filing of the application and the sending out of the decision has been 75 days. This period is divided as followed: 18 days from the filing to the hearing, and 57 days from the first hearing to the decision. It is impossible to decrease the time between filing and hearing to any great extent, because, where hearings are held outside of San Francisco and Los Angeles, considerable time is consumed in making the necessary arrangements to hold hearings at distant and often almost inaccessible places. It will be the aim of the Commission to reduce the time between hearing and decision as much as possible. Every endeavor will be made to have the hearing held at the time first set, though frequent necessity for exhaustive medical examination will lengthen the time in many cases. After hearing and submission of the case it often takes considerable time to have the transcript written. The Commission, therefore, can not have the final papers prepared and take the case up for decision immediately.

The average number of days between submission and decision has been 29.31 days. During the next fiscal year, we trust that the time consumed in adjudicating a case will be materially lessened.

Cases Filed July 1, 1915, to June 30, 1916.

	Law of 1911	Law of 1913	Total
1915—July	----------	80	80
August	----------	107	107
September	----------	107	107
October	----------	152	152
November	----------	140	140
December	----------	120	120
1916—January	----------	120	120
February	----------	111	111
March	----------	110	110
April	----------	119	119
May	1	114	115
June	----------	123	123
	1	1,403	1,404

Statistics of Cases Filed Under Law of 1911 and Law of 1913, to June 30, 1916.

	Law of 1911	Law of 1913	Total
Cases filed to December 31, 1913	69	----------	69
Cases filed from January 1, 1914 to June 30, 1914	32	291	323
Cases filed from July 1, 1914, to June 30, 1915	23	1,128	1,151
Cases filed from July 1, 1915, to June 30, 1916	1	1,403	1,404
Total cases filed	125	2,822	2,947

Average per month, January 1 to June 30, 1914	56
Average per month, July 1, 1914, to June 30, 1915	96
Average per month, July 1, 1915, to June 30, 1916	117
Percentage of increase	22

In 813 cases (58.4 per cent) the decision was for the applicant and in 337 (24.2 per cent) for the employer. The percentage of cases decided against the applicant (24.2 per cent as against 24.5 per cent last year) has not changed, while the percentage of awards has decreased slightly. This is accounted for by the increase in those cases settled and dismissed (often without a hearing). The Commission endeavors both before and after an application has been filed to settle a claim without hearing, wherever possible.

At the beginning of the fiscal year there were 330 cases pending, and at the close 342, showing that the Commission had adjudicated in the year the equivalent of all the cases filed. Hernias have been a constant cause of dispute. The number of these cases has been nearly doubled. Those brought in this fiscal year constituted 6.4 per cent of the total number, as compared with 3.8 per cent of the previous fiscal year.

Classification as to Decisions of Decided Cases from July 1, 1915, to June 30, 1916.

	Law of 1911	Law of 1913	Total
Awarded compensation	1	812	813— 58.4%
Denied compensation		337	337— 24.2%
Settled and dismissed	3	145	148— 10.7%
Dismissed	1	93	94— 6.7%
Totals	5	1,387	1,392—100 %
Cases pending June 30, 1915	5	325	330
Cases filed 1915–16	1	1,403	1,404
Total cases before Commission	6	1,728	1,734
Cases adjudicated	5	1,387	1,392
Cases pending June 30, 1916	1	341	342

Classification as to Principal Questions Involved in Decided Cases from July 1, 1915, to June 30, 1916.

	Law of 1911	Law of 1913	Total
Extent and duration of disability	2	416	418
Extent of disability	2	133	135
Whether disability was result of injury		81	81
Whether injury was in course of employment		178	178
Jurisdiction	1	107	108
Extent of permanent disability		162	162
Hernia		91	91
Wilful misconduct		22	22
Intoxication		13	13
Payment of medical bills		50	50
Average annual earnings		20	20
Whether employee or independent contractor		38	38
Lump sum settlement		8	8
Statute of limitations		36	36
Refusal to submit to medical treatment		8	8
Dismissed for want of prosecution		4	4
Who was employer		10	10
Whether notice was given employer		3	3
Liability of principal or subcontractor		1	1
Election of remedies		2	2
Liability for funeral expenses		2	2
Whether compensation becomes part of estate of dependent		1	1
Liability for unpaid compensation at time of death		1	1
Cases decided	5	1,387	1,392
Cases pending	1	341	342
Total cases before Commission	6	1,728	1,734

Fatal injuries before the Commission numbered 239. Of these, nine were dismissed, and compensation denied in 52, leaving 178 death cases, in which $369,672.88 was awarded to dependents. This is an average of $2,077.13 in each case, or $208.16 per case less than for the previous fiscal year. The awards on permanent disabilities also show a decrease in the amount of disability indemnity per case, that is, from $1,136.65 to $976.47 per case. The total amount awarded to employees to enable them to accommodate themselves to their new condition on account of permanent disability was $206,036.11, divided among 211 applicants.

Of the 904 cases involving temporary disabilities, 68 were dismissed, and compensation denied in 264. Of the 572 cases in which the injured party was entitled to a disability indemnity, in 389 a definite termination of the disability was made, and 183 involved an indeterminate award continuing until the injured man should recover. The average amount of disability indemnity in the completely determined cases was $93.06, or $20.64 less than last year; while for the 183 indeterminate cases, the amount ordered paid shows an increase per case of $41.09; that is, $178.28 per case.

The grand total ordered paid by the Commission as an outcome of contested cases for the support of the injured or their dependents was $643,437.02. Employers were ordered to pay for medical services to the amount of $8,922.75. This covers but a small part of the cost of the medical services to which the injured applicants were entitled, because of the fact that in most cases the defendants had furnished the medical services and such services were a matter of contract and outside of the jurisdiction of the Commission.

Classification as to Injury and Award of Decided Cases, July 1, 1915, to June 30, 1916.

	Temporary			Permanent			Total			Grand total
	Law of 1911	Law of 1913	Total	Law of 1911	Law of 1913	Total	Law of 1911	Law of 1913	Total	
Compensation awarded	1	480	481	-----	180	180	-----	152	152	813
Compensation denied	-----	264	264	-----	21	21	-----	52	52	337
Cases settled	1	90	91	-----	31	31	2	24	26	148
Cases dismissed	1	67	68	-----	17	17	-----	9	9	94
			904			249			239	1,392

Value of Awards in Decided Cases from July 1, 1915, to June 30, 1916.

	Law of 1911	Law of 1913	Total
Deaths	$1,100 00	$368,572 88	$369,672 88
Permanent disability	-----	206,036 11	206,036 11
Temporary disability	200 00	35,999 22	*36,199 22
	$1,300 00	$610,608 21	*$611,908 21

*Plus payment till recovery in 183 cases, $31,528.81 ordered paid.

Miscellaneous Statistics of Cases Decided.

Rehearings granted	64	
Rehearings denied	155	
Rehearings asked		219
Other supplementary proceedings		291
Total supplementary proceedings		510
Appeals taken		48
Medical references ordered		230
Cases involving insurance carriers		858
Cases without insurance carriers		534
Hearings held in 1,392 cases		1,577

Distribution as to Location of Cases Decided from July 1, 1915, to June 30, 1916.

	Law of 1911	Law of 1913	Total
San Francisco and vicinity		453	453
Los Angeles and vicinity	1	341	342
Remainder of state	4	593	597
	5	1,387	1,392

REPORT OF PERMANENT DISABILITY RATING DEPARTMENT.

Organization.

The Permanent Disability Rating Department was organized in July of 1913 to put into practical application a plan for rating permanent disabilities.

Need of a Proper Method of Rating.

A proper method of rating permanent disabilities adds much to the efficiency of a workmen's compensation act, for while the number of such injuries is relatively small as compared to all injuries, the effect of accidents of this character upon the working population is most important.

Faults of Previous Rating Schedules.

Permanent disability schedules have been used in connection with many compensation laws in the United States, but most of these schedules are based upon physical loss only, and award varying amounts for injuries enumerated as causing permanent disability. These amounts are paid to all employees who sustain the same kind of injury, irrespective of the employee's age and his occupation, and other factors which we have found in California to be of the utmost importance. A rating at best can only be approximately right; so much for an arm and so much for a leg, is so crude that it will work injustice in a very large proportion of cases. The index finger is more valuable to a typesetter or a stenographer than it is to a laborer, and the loss of a leg to a bookkeeper is not so serious a misfortune as it is to a stevedore.

Accommodation.

The previous bulletins have discussed the bearing of age, occupation, physical requirement and nature of injury, upon the percentage of permanent disability rating. As we gather experience and see the accommodation which some persons get in comparatively short periods of time and the prolonged period of time that it takes others to get accommodation with substantially the same injury, and when we see the excellent anatomical results and restoration of the major part of the function in some cases and quite the reverse in others—the injury suffered being to the same part of the anatomy—we at once realize the necessity of making the schedule elastic.

This has caused the Commission to formulate rules whereby minimum and maximum limits are established as represented by lines in the schedule. If the deformity, due either to poor treatment or marked fragmentation or infection, etc., results in the injured person having a very marked disability, so that objectively it can be seen that he has only a small amount of function in the injured member, the maximum line under the particular classification would be applied. Whereas, if another person were injured and suffered the same anatomical damage without infection and with excellent surgical results, with only a slight loss of function accompanied by possibly some pain, and an occupation which would measure a considerable physical requirement, we would read the minimum line in one of the higher tables. At any rate, our experience has taught us that mere anatomical description of the original injury in itself need not result in the maximum of disability for that group of injuries, the measurement of permanent partial disability being guided frequently by the duration of the temporary disability.

The measurement of disability for decreases of vision is made by means of applying certain lines in the schedule in the particular table under which applicant falls, depending upon his occupation. This same rule is being worked out in cases of vertigo, the basis of which is nystagmus reaction.

Although the schedule was completed and ready for use January 1, 1914, we have found it necessary to make provision for additional injuries, and to make the schedule more elastic. To do this we read lines in the schedule between the minimum and maximum limit, these limits being established by the Commission. Changes are being considered and recommended from time to time in both the classification of occupations and the classification of injuries, as experience warrants.

With the information collected covering a period of three and a half years, we have been able to avail ourselves of much interesting and valuable data with which we will be enabled to work out and tabulate the results of schedule rating.

Tables.

The following tables summarize and analyze to some extent the results of our efforts during the past eighteen months. The experience for 1914 shows that out of 1,292 permanent injuries reported to the Statistical Department, the Permanent Disability Rating Department rated upon formal application 618, or 48 per cent. This year, out of 1,264 permanent injuries reported to the Statistical Department, this department rated 866, or 68½ per cent. A glance at these percentages shows that the work of this department is constantly increasing, and that employers, insurance companies and injured workmen are coming to rely more and more upon the Commission to determine the amount of compensation due for permanent injuries.

Reference to Table I shows that accidents occurring under the Roseberry Act are being referred to this department for rating, the parties concerned wishing to have their liability determined under the Workmen's Compensation, Insurance and Safety Act rather than under the Roseberry Act. Table I also shows that during the first six months of the year 1916 we have considered approximately 63⅓ per cent as many cases as were considered during the whole year of 1915.

Under Table II, 78 cases are classified as "Not Ratable." This means that although the injury is permanent, it is not considered serious enough to entitle the injured man to any permanent disability compensation.

TABLE I.

A Summary of Cases Considered.

Disposition of cases considered	Accidents occurring under Roseberry Act	Accidents occurring during 1914	Accidents occurring during 1915	Accidents occurring during 1916	Totals
Cases considered during 1915—					
Rated	6	375	486	----------	867
Open October 1, 1916	----------	2	7	----------	9
Not permanent	----------	13	11	----------	24
Closed for lack of data	----------	7	3	----------	10
Totals	6	397	507	----------	910
Cases considered during first six months of 1916—					
Rated	1	39	328	181	549
Open October 1, 1916	----------	3	17	8	28
Not permanent	----------	----------	12	6	18
Closed for lack of data	----------	1	2	----------	3
Totals	1	43	359	195	598

TABLE II.

A Study of 1,416 Cases Rated.

Rating groups	1915			1916, first 6 months		
	Number of cases	Percentage of total number of cases rated	Average rating	Number of cases	Percentage of total number of cases rated	Average rating
Rated	867	100.00	19.72	549	100.00	18.35
Rated as "not ratable"	44	5.07	-------	34	6.19	------
Rated over no rate and less than 5%	128	14.76	3.45	78	14.21	3.51
Rated at 5% or over and less than 10%	157	18.11	7.09	110	20.04	7.02
Rated at 10% or over and less than 20%	179	20.65	14.71	125	22.77	15.57
Rated at 20% or over and less than 30%	159	18.34	24.25	102	18.58	23.71
Rated at 30% or over and less than 40%	91	10.50	33.80	52	9.47	34.14
Rated at 40% or over and less than 50%	49	5.65	43.54	21	3.83	43.45
Rated at 50% or over and less than 60%	24	2.77	53.90	14	2.55	54.20
Rated at 60% or over and less than 70%	24	2.77	61.98	4	.73	64.75
Rated at 70% or over	12	1.38	89.58	9	1.64	93.06

MEDICAL DEPARTMENT.

The organization of the medical affairs of the Industrial Accident Commission remains substantially the same as described in report of 1914–1915. The professional force has been augmented to meet the requirements of increasing number of cases, broadened scope of the law, and accumulated information.

Statistics of the department show an increase in the number of cases in which special medical examiners were appointed at the request of the Commission, in which opinion involving research was requested of the Medical Department, and in which examination of the individual, by the medical staff was requested. On the other hand, the number of cases examined for employers or for insurance companies has diminished slightly.

The most notable increase has occurred in the number of cases actually examined by the medical staff. This has promoted dispatch in transaction of business and is a method applicable to cases which are fairly clear and of comparatively minor importance. Those cases, however, which require very considerable investigation and observation must be sent to medical examiners, specially equipped to handle cases under examination.

The following report will be a discussion of the problems of the medical side of the duties of the Industrial Accident Commission and the State Compensation Insurance Fund together.

It will be apparent that the interests of the Industrial Accident Commission and the State Compensation Insurance Fund lie parallel to a large extent. The Commission feels that the Workmen's Compensation, Insurance and Safety Act places an obligation on it which is not specifically defined in the text of the law. That is, it feels responsible for the surgical results to the injured workingman coming under its care. It feels that besides scrutinizing results from the standpoint of indemnities deserved, it should scrutinize them from the standpoint of good surgery and surgery which might have been accorded.

The Commission, when it began to administer the Workmen's Compensation, Insurance and Safety Act, found itself confronted with a problem which was comparatively unknown. There were few commissions in this country. The laws in existence had less scope than the California law. No similar commission had gone very far and all were pioneering. The foreign laws helped little because of differences in the basic principles of government. Our Commission had to make all the rules of procedure and establish its own precedents.

A parallel condition existed in the medical affairs of the Commission. Very few men in this country had ever been called upon to meet great responsibility in the question of trauma and its results. The books, when they mentioned trauma at all, merely "mentioned it". They did not give responsible information.

The Industrial Accident Commission gathered a group of medical men to which the task of advising it in these subjects has fallen. These men, by their studies of the cases, and the needs of the Commission, and by their general familiarity with the work, have become most valuable. They would be surprised to learn the change in their point of view in the last two and one-half years, and surprised to realize their greater facility in handling the ordinary run of cases. However, just because the medical experts are scientific and conscientious men, the Commission is sometimes left in a dilemna. Medical and surgical information is not complete. Little of it is exact science. A given train of events will not necessarily lead to a given issue. Some things may not be stated positively by men who regard their reputations. The Commission sometimes finds a conscientious equivocal statement confronted by a comparatively irresponsible positive statement on a point in which there is not much knowledge.

Of course the Commission must listen to interested parties. Some doctors are not above serving a cause which is not scientific; some are willing to make positive statements without positive knowledge, and some seem to forget that they are responsible for their words.

It is in this matter and kindred matters that the group of specialists with which the Commission has surrounded itself is most valuable.

The Commission, by referring to its special medical examiners, obtains authoritative information from the standpoint of the highest surgical knowledge, and armed with this knowledge is able to make decisions which are just and accurate, in spite of contrary information.

A parallel condition of things applies to the State Compensation Insurance Fund. The Fund has access to exactly the same group of specialists and experts that the Commission has. Just as the experts of the Commission are called upon to scrutinize the results of surgery, good and bad, coming before it, so these experts are called upon to scrutinize and frequently to correct the results of surgery, good and bad, performed for the Fund.

The Industrial Accident Commission has, under the law, no authority directly to influence the choice of a surgeon by the employer. The law provides the employer with this authority. The best that the Commission can do when it witnesses results of poor surgery is to invite attention to the fact and to impose upon the employer the penalty of the indemnities due because of loss of function which results. The State Compensation Insurance Fund, on the other hand, by virtue of the contract which the law permits it to make with the employer of the injured man, has power to select the surgeon.

Because of the public character of the State Compensation Insurance Fund, it has never been deemed advisable to make contracts with a group of doctors to carry on all of the work of the Fund, although it is recognized that such a course, from the standpoint of efficiency, might be the best.

The Fund has accepted the services of the physicians called by the employers and in doing so has experienced practically the same results in costs and in disabilities as have the other insurance companies. Some very interesting suggestions come from the study of the experience of the insurance companies. The statistics of costs of compensation and the proportion of costs of medical service to indemnity can not be at all accurately determined until some years after the experience. From the statistics at hand which serve to guide, but do not confirm, it appears that employers who carry their own insurance and who provide their own medical service through contracts with medical men show the lowest medical cost.

The insurance companies which are most liberal to the doctors and which allow the greatest latitude in the selection of doctors, experience the largest medical cost. The Fund does not appear to have found medical service as costly as have several others of the insurance companies, which have adopted methods similar to those of the Fund.

It is a noteworthy fact that the proportion of indemnity paid for injury remains practically the same in the experience of more important companies. Of the insurance companies which partially, or wholly, contract their work, some have experienced high medical costs and high indemnities, above the average. Others have experienced medical costs and indemnities considerably below the average.

In this fact there seems to be some significance, since the character of the medical men appears to play a part. The company with the closest personal scrutiny by its medical chief, and the highest type of medical men to do the work, seems to obtain the cheapest and best medical results.

As indicated above, the statistics lead only to impressions. They are incomplete and those dealt with include only the more minor injuries. It is obvious that in the more serious injuries, the better the surgery, the better will be the result, and the cheaper the total costs.

There is a difference between the exactions of medical work and of accident surgical work. Ordinarily in medical work the emergency is not in the beginning. It does not matter very much what the treatment is or what the exact diagnosis is as early as it does in surgical work. Frequently the course of a surgical case is determined by the first treatments. This leads to the thought that to obtain the best surgical results in accident cases, the injured must fall into the hands of a competent surgeon with the least possible delay. Furthermore, it leads to the thought that unless a doctor is qualified to do major surgery he should not attempt to handle a major surgery case except in emergency, and if he is not able to handle major surgery or to perform major surgical operations, he is ill-equipped to make surgical diagnosis or even to recognize major surgical conditions. A minor surgical case frequently develops into a major case. The less skilful the surgeon the more frequently this happens. The State Compensation Insurance Fund has planned to put into effect an arrangement substantially as follows:

The well-equipped surgeons in all communities will be invited to do the work of the State Compensation Insurance Fund under certain restrictions. They must cooperate in the matter of reports and information furnished the home office of the Fund. They must be willing to keep adequate records for future reference and to cause X-ray examinations to be made in accordance with modern surgical precepts. They must be willing to accept the fee schedule.

It will be seen, then, that in each community there will be a number of physicians appointed to whom those insured in the Fund will be directed to send their injured employees. These doctors will be directly responsible to the State Compensation Insurance Fund.

The character of the medical service rendered the individuals who have been injured determines to a larger extent than would appear on the surface, the length of disability. The question is not only one of recovery from the injury with the least possible deformity. It goes further than this. It involves the restoration to full function which often depends on complex psychic conditions. The function of the surgeon is more than mechanical. He must be the physician and he must be in sympathy with his patient. He must treat him as his mental endowment and his mental attitude require.

Many of the insurance companies have had a great deal of trouble with disabilities resulting from accidents in which the original injury is really not the source of great difficulty. They have had the greatest trouble with traumatic neurosis. They have besides had a great deal of difficulty in restoring to function individuals who will not try to help themselves; who can not be detached from the idea that mere pain and discomfort without inability to labor are compensable.

It must be the effort of the Industrial Accident physicians to encourage the injured, to allay their fears regarding their rights and their future, and to counteract the effect of the pernicious activity sometimes displayed by well-meaning friends.

The Industrial Accident surgeon should be quick to detect evidences of mental depression. One of the most difficult subjects is the restoration of injured individuals to function when such restoration necessitates the experiencing of pain and discomfort.

The more personal the contact between the doctor and his patient, the more confidence will be established and the better and quicker will be the result. The same theory applies equally well to the relation between the State Compensation Insurance Fund and its doctors.

The establishment of confidence and understanding and the avoidance of bickering and technicalities will produce an ideal situation. The plan which the State Compensation Insurance Fund will adopt involves more medical supervision and more accurate contact and observation of cases than has heretofore been attempted.

Many insurance companies have joined together to contract for medical service. This system should be deplored. It tends to lead, and has led, to exactly the situation alluded to before. It has led to dissatisfaction among the injured, to injustice and to misunderstanding. It has led to disabilities from neurasthenia. Our belief is that such a system is the most important cause of neurasthenia. Such "wholesale" medical treatment is good for neither the doctor, the injured, the insurance company, the Workmen's Compensation, Insurance and Safety Act, nor society. Cooperation of the Commission, insurance companies, employers, injured men and medical profession, is the ideal situation.

INSURANCE.

Solvency of Insurance Carriers of Paramount Interest.

Considerable publicity has been given to the failure of one of the carriers, which engaged extensively in the business of compensation insurance in California. This failure resulted in widespread loss throughout the state, not only loss to employers born of the necessity of paying premiums to other carriers to protect them for unexpired terms of policies in force, but the very serious loss suffered by injured workmen and dependents of the killed for whose benefit the compensation system was designed and whose claims for indemnity were left unpaid.

As a commentary upon our supervisory system it should be stated that those conversant with the subject fully realize that much of that loss and suffering could have been prevented had our statutes been less lenient with tottering insurance institutions and had more power been vested in the State Insurance Commissioner to deal with such situations.

It is generally understood that insurance concerns have been permitted to operate in California under conditions which would prevent their securing a license in states, such as New York and Massachusetts, where more stringent statutory requirements are in effect for the protection of the public. The State Insurance Commissioner devotes a short but spirited paragraph of his latest annual report to this situation and it is to be hoped that the condition may be remedied at the next session of the Legislature.

The rating statute, which became effective since the failure herein referred to, is expected to be of great assistance in the prevention of indiscriminate rate cutting and has already resulted in improved conditions. It has minimized discrimination; it has brought about more uniformity in the collection of statistics to indicate the true cost of compensation in each classification; and as the rates have undergone another general revision downward, the total cost of insurance to employers of the state has, no doubt, been reduced rather than increased under this statute. It must be admitted, of course, that those employers who had previously enjoyed material cuts under standard rates have been obliged to pay more for their insurance, but considering the increased value of the protection, the increased value of statistics for better relative adjustment of rates, and the general downward revision which rates have undergone, it can not be recognized that those employers have any just ground for complaint.

As suggested in previous report, the rating statute is a step in the right direction but it is not sufficient of itself to prevent a repetition of failures such as have occurred in the past.

General Report of State Compensation Insurance Fund.

That the State Compensation Insurance Fund of California has proved a pronounced success is now generally conceded by all who have been in a position to watch its progress. Since the end of its first year, when its volume of compensation premiums exceeded that of any other insurance carrier operating in the state, its commanding lead over competitors has steadily increased and its assets have grown to an amount exceeding $1,000,000.

While the expense ratio of the Fund increased somewhat the second year, this was inevitable because of the necessity of auditing pay rolls of employers during the preceding annual period and because of extensive safety work undertaken by the Fund independent of the safety organization of the Industrial Accident Commission proper. This increased expense for auditing and safety work will, of course, be more than offset by its effect in keeping down the loss ratio. During the first half of the current year (ending June 30, 1916), the expense ratio of the Fund is shown to have been less than in the year 1915, as may be noted from the statistical report of the Fund hereinafter given, and during no period has the expense ratio even approached a figure of one-half the average expense ratio of corporate insurance carriers.

At the close of the year 1914 the Fund declared a dividend to policyholders amounting to 15 per cent of premiums earned in that year, and at the close of the year 1915, despite lower rates having been in effect; the same average refund was allowed, though the latter was apportioned to policyholders on a varying scale, dependent upon the loss experience of the individual risks within the several hazard groups. On June 30, 1916, $134,381.98 had been actually paid in refunds to policyholders for the two years mentioned and additional refund payments are being made as the balance of 1915 earned premiums are accurately determined by pay roll reports and audits. The total for the two years will probably exceed $170,000.

Attention is particularly called to the fact that the actual refunds made to policyholders do not constitute the entire saving for patrons of the Fund, and that the percentage returned really represents a saving in operating cost only. Under the California reserve requirements it is now necessary to maintain a loss reserve equal to 75 per cent of the earned premiums, less losses and loss expenses actually paid, this leaving only 25 per cent (plus income from investments) with which to meet administration expenses and pay dividends to insured employers. The actual indicated profit, basing outstanding liabilities upon most liberal estimates for open cases, exceeds 40 per cent. The difference between the profit and the amount returned can not be released to surplus or for further dividends to those policyholders who contributed to its accumulation until the fifth year following the year in which the policies were issued. As this reserve so far exceeds the ratio of loss anticipated in rate calculations, it is generally considered excessive and it is hoped that this statute can be modified without impairing the protection of claimants for which reserve requirements are intended. This statute was originally enacted on the assumption that corporate insurance carriers would be able to reduce operating expenses to 25 per cent, and the rates could be based upon a loading of 75 per cent for losses and 25 per cent for expenses. This expectation has not been realized and rates have been promulgated upon the theory that 40 per cent would be necessary for expenses and 60 per cent for losses. We are now informed, however, that the Workmen's Compensation Service Bureau of New York has quite recently changed its loading to 62½ per cent for losses and 37½ per cent for expenses. This would indicate that the corporate companies have been able to reduce their expectancy of expense only 2½ per cent while the State Compensation Insurance Fund (paying its entire expenses from premiums) shows a total average expense ratio, including Claim Department expense, of only 14.47 per cent, or only 10.15 per cent excluding claim adjustment expense. The investment income of the Fund alone will meet approximately one-half of this latter expense for the current year.

FINANCIAL REPORT.

State Compensation Insurance Fund.

Statement Covering Operations from January 1, 1914, to June 30, 1916.

Appropriation (Chapter 180, laws of 1913)	$100,000 00	
Premiums written, less premiums returned	1,679,582 16	
Interest received, due and accrued	58,178 54	
		$1,837,760 70
Expenses and salaries (including adjustment expenses)	$213,736 05	
Compensation and statutory medical payments	396,803 06	
Unearned premium reserve	202,717 51	
Statutory reserve for outstanding losses (75 per cent of earned premiums less losses and loss expenses paid)	647,048 49	
All other disbursements and liabilities	1,010 24	
		1,461,315 35
Total surplus		$376,445 35
Less dividends to policyholders		134,381 98
Net surplus		$242,063 37

The above statement is based on the statutory reserve of $647,048.49, to cover outstanding liabilities. If the indicated amount of such

STATE COMPENSATJON INSURANCE FUND.

Statistical Report Covering Period from January 1, 1914, to June 30, 1916.

	1	2	3	4	5	6	7	8	9	10	11	12	13
Year	Premiums written	Premiums earned	Interest earned	Losses incurred	Expenses			Dividends	Other liabilities	†Net surplus, excluding appropriation		Mean assets	Mean invested assets
					Claim	All other	Total			L. R. B.	E. O. B.		
1914	$547,161 24	$496,142 29	$12,191 00	$192,961 84	$18,458 76	$44,306 18	$62,764 94	$74,475 88		$17,444 52	$178,130 63	$310,297 85	$232,757 50
1915	655,676 55	604,983 20	27,761 76	318,217 34	27,628 64	65,925 19	93,553 83	59,906 10	$89 14	53,087 13	160,978 55	685,287 85	552,342 92
1916*	476,744 37	375,739 16	18,225 78	227,174 38	17,709 54	39,707 74	57,417 28		921 10	71,531 72	108,452 18		
Totals	$1,679,582 16	$1,476,864 65	$58,178 54	$738,353 56	$63,796 94	$149,939 11	$213,736 05	$134,381 98	$1,010 24	$142,063 37	$447,561 36		
Percentages. Columns 3 to 11 to written premiums			$\frac{3 \times 100}{1}$	$\frac{4 \times 100}{1}$	$\frac{5 \times 100}{1}$	$\frac{6 \times 100}{1}$	$\frac{7 \times 100}{1}$	$\frac{8 \times 100}{1}$		$\frac{10 \times 100}{1}$	$\frac{11 \times 100}{1}$	$\frac{3 \times 100}{12}$	$\frac{3 \times 100}{13}$
1914			2.23	35.27	3.37	8.10	11.47	13.61		3.19	32.56	3.93	5.24
1915			4.23	48.53	4.21	10.05	14.27	9.14		8.10	24.55	4.05	5.03
1916*			3.82	47.65	3.71	8.33	12.04			15.00	22.75		
Totals			3.46	43.96	3.80	8.93	12.73	8.00		8.46	26.65		
Percentages. Columns 3 to 11 to earned premiums			$\frac{3 \times 100}{2}$	$\frac{4 \times 100}{2}$	$\frac{5 \times 100}{2}$	$\frac{6 \times 100}{2}$	$\frac{7 \times 100}{2}$	$\frac{8 \times 100}{2}$		$\frac{10 \times 100}{2}$	$\frac{11 \times 100}{2}$		
1914			2.46	38.89	3.72	8.93	12.65	15.01		3.52	35.90		
1915			4.59	52.60	4.57	10.90	15.46	9.90		8.77	26.61		
1916*			4.85	60.46	4.71	10.57	15.28			19.04	28.86		
Totals			3.94	49.99	4.32	10.15	14.47	9.10		9.62	30.30		

*The year 1916 includes only the first six months.

†The net surplus, excluding appropriation, has been shown on two bases. The initials L. R. B. indicate legal reserve basis. On this basis the reserve for outstanding losses has been taken as 75 per cent of the earned premiums less losses and loss expenses actually paid. The initials E. O. B. indicate estimated outstanding basis. On this basis the reserve for outstanding losses has been taken as the estimated cost of settling all outstanding claims, including very liberal estimates to cover undetermined cases

[illegible]

liabilities ($341,550.50, including liberal estimates for all undetermined cases) were used, the surplus would be as follows:

Total surplus	$681,943 34
Less dividends to policyholders	134,381 98
Net surplus	$547,561 36

The increase of $305,497.99 in net surplus indicated by the last figures is available as an additional protection against catastrophe pending further distribution to policyholders when reserves have been held the statutory time. Meantime these funds are invested in approved California securities and drawing interest for the further benefit and protection of policyholders.

SAFETY DEPARTMENT.

The past year has been marked especially by the work of various committeees in aiding the Commission in preparing Safety Orders. The tentative general safety orders, covering hazards including gears, belts, pulleys, shafting, etc., were presented for public hearing on August 25, 1915, and September 3, 1915, in San Francisco and in Los Angeles, respectively. As very little criticism was offered at either of these public hearings, the Commission adopted them practically without change and set January 1, 1916, as the date on which they would become effective.

Subcommittees presented tentative safety orders for laundries, engines, woodworking and elevators. The personnel of these subcommittees was as follows:

San Francisco Subcommittee on Laundry Safety Orders.

Charles Hawley (chairman), business agent Laundry Workers' Union, representing the Laundry Workers; Frank Huebsch, Metropolitan Laundry, representing the Laundry Owners' Association; H. H. Buddington, vice president Western Laundry Machinery Co., representing Manufacturers of laundry machinery; John R. Brownell (secretary), superintendent of safety, Industrial Accident Commission.

Los Angeles Subcommittee on Laundry Safety Orders.

W. H. White (chairman), Western Laundry Machinery Co., representing the Manufacturers of laundry machinery; G. A. Miller, president Troy Laundry Co., representing the Southern California Laundrymen's Association; Samuel Cozad, superintendent Munger's Laundry, representing the Laundry Workers; H. L. Boyd (secretary), safety engineer, Industrial Accident Commission.

San Francisco Subcommittee on Engine Safety Orders.

F. H. Varney (chairman), chief engineer operation and maintenance, Pacific Gas and Electric Co.; (F. W. Small, Pacific Gas and Electric Co., alternate to Mr. Varney); E. A. Selfridge, Jr., Northwestern Redwood Co.; W. R. Towne, representing the International Association of Steam and Operating Engineers, Local No. 64; J. T. Thorpe, representing the International Association of Machinists; W. H. Healy, president Healy-Tibbitts Construction Co.; R. L. Hemingway, safety engineer, Industrial Accident Commission; John R. Brownell (secretary), superintendent of safety, Industrial Accident Commission.

Los Angeles Subcommittee on Engine Safety Orders.

W. Lewis Bell (chairman), president Fulton Engine Works; George S. Graham, Fairbanks-Morse Co.; David Brian, chief engineer Hotel Clark; George C. Flint, erecting engineer Los Angeles County; J. A. Young, chief engineer Western Gas Engine Co.; Henry Wiatt, superintendent electric manufacturing, Los Angeles Gas and Electric Corporation; Ernest Powelson, representing Machinists' International Union, No. 311; H. L. Boyd (secretary), safety engineer, Industrial Accident Commission.

San Francisco Subcommittee on Woodworking Safety Orders.

John P. Lorden (chairman), J. P. Lorden Mill Co., representing San Francisco Planing Mill Owners' Association; John A. Koster, vice president California Barrel Co., representing the cooperage interests; Walter A. Chowen, manager California

Inspection Rating Bureau, representing the Casualty Underwriters' Association of California; Charles A. Smith, secretary California Metal Trades Association; Frank C. Miller, business representative Pattern Makers' Association; John R. Brownell (secretary), superintendent of safety, Industrial Accident Commission.

Los Angeles Subcommittee on Woodworking Safety Orders.

Charles J. Woerner, representing the Western Cooperage Co.; A. J. Koll, representing Southern California Mill Owners' Association; Henry Holland, superintendent southern California, California Inspection Rating Bureau, representing the Casualty Underwriters' Association of Southern California; E. L. Bruck, representing Pattern Makers' Union; J. W. Buzzell, representing Metal Trades Council; H. L. Boyd, (secretary), safety engineer, Industrial Accident Commission.

San Francisco Subcommittee on Elevator Safety Orders.

Dr. T. B. W. Leland (chairman), coroner of San Francisco County; S. P. Oppenheim, manager David Hewes Building, representing the Building Owners and Managers' Association of San Francisco; Earl A. Stem, member Local Union No. 8, I.U.E.C., representing the International Union of Elevator Constructors; (E. W. McGee, member Local Union No. 8, I.U.E.C., alternate to Mr. Stem); John P. Horgan, chief building inspector of San Francisco, representing the Board of Public Works of San Francisco; Warren Hilleary, superintendent, Division of Accident Prevention, Royal Indemnity Company, representing the Casualty Underwriters' Association of California; (T. C. Thayer, engineer, Pacific Division, London and Lancashire Indemnity Company of America, and A. F. Skaife, inspector, Fidelity and Deposit Company of Maryland, alternates to Mr. Hilleary); O. J. Smith, superintendent of inspection, California Inspection Rating Bureau; Herbert S. Snead, engineer, Otis Elevator Company; E. C. Wood, elevator safety inspector, Industrial Accident Commission; John R. Brownell (secretary), superintendent of safety, Industrial Accident Commission.

Los Angeles Subcommittee on Elevator Safety Orders.

Frank G. Cox (chairman), local manager Otis Elevator Company; (D. V. Lever, construction superintendent, Otis Elevator Company, alternate to Mr. Cox); Roy C. Seeley, secretary, Building Owners and Managers' Association of Los Angeles; (J. M. Best, member Building Owners and Managers' of Los Angeles, altenate to Mr. Seeley); H. A. Shurtleff, Elevator Constructors' Union, No. 18; J. J. Backus, chief inspector of buildings, city of Los Angeles; William H. Carter, city boiler and elevator inspector, city of Los Angeles; Charles H. Gray, Maryland Casualty Company, representing the Casualty Underwriters' Association of Southern California; Roy L. DeCamp, Baker Iron Works, Los Angeles; Ira J. Francis, John A. Roebling's Sons Company; H. L. Boyd (secretary), safety engineer, Industrial Accident Commission.

Public hearings on these various safety orders were held in San Francisco and in Los Angeles as follows:

	San Francisco	Los Angeles
Laundry Safety Orders	Apr. 24, 1916	May 8, 1916
Engine Safety Orders	Apr. 25, 1916	May 9, 1916
Woodworking Safety Orders	Apr. 26, 1916	May 10, 1916
Elevator Safety Orders	Apr. 27, 1916	May 11, 1916

Following the public hearings, the safety orders for laundries, engines and woodworking were adopted with very few changes from the tentative form, and the Commission fixed August 1, 1916, as the date on which they would become effective. There was much discussion at the public hearings on the proposed elevator safety orders, and a number of sections were referred back to the committees, after which the Commission adopted the elevator safety orders in their final form and set October 1, 1916 as the date on which they would go into effect.

Tentative boiler safety orders were drawn up by the following subcommittees:

San Francisco Subcommittee on Boiler Safety Orders.

George A. Armes (chairman), representing the Union Iron Works, as manufacturers of boilers; (Frederick Birdsall, alternate to Mr. Armes); J. B. Warner (vice chairman), representing the Hartford Steam Boiler Inspection and Insurance Company; E. R. Killgore, representing the Standard Oil Company, as users of boilers; D. P. Delury, representing the Board of Public Works of San Francisco; M. J. McGuire, representing the Boilermakers and Shipfitters' Union; W. R. Towne, representing the International Union of Steam and Operating Engineers, Local No. 64; Chas. A. Smith, representing the California Metal Trades Association; John Mitchell, representing the International Union of Steam and Operating Engineers, Local No. 507; R. L. Hemingway, safety engineer, Industrial Accident Commission; John R. Brownell (secretary), superintendent of safety, Industrial Accident Commission.

Los Angeles Subcommittee on Boiler Safety Orders.

Fred J. Fischer (chairman), representing the National Association of Steam Engineers, No. 2; H. L. Doolittle (vice chairman), representing the Southern California Edison Company; J. J. Malone, representing the Hartford Steam Boiler Inspection and Insurance Company; William H. Carter, chief city boiler and elevator inspector, representing the city of Los Angeles; S. M. Walker, representing the Pioneer Boiler and Machine Works; J. L. Glennon, representing the Fidelity and Casualty Company of New York; M. E. Carroll, representing the Steam and Operating Engineers, No. 72; E. C. Jordan, representing the Firemen's Local, No. 220; H. L. Boyd (secretary), safety engineer, Industrial Accident Commission.

Copies of these tentative orders were widely distributed and notices sent out announcing public hearings to be held in July, 1916.

The superintendent of safety delivered a number of lectures to employees of various industrial plants, and accompanied Commissioner Will J. French to Eureka to attend the Pacific Logging Congress in October, 1915. As a part of its proceedings in Eureka the Congress held a welfare dinner, during which Commissioner French gave an address on accident prevention in the woods and the superintendent of safety gave an illustrated talk, showing by photographic reproduction the various hazards incident to logging and sawmill operations, and giving the remedies which would tend to minimize accidents in that particular industry.

The Panama-Pacific International Exposition invited the Commission to hold a Safety Conference as one of the Exposition proceedings. As a similar invitation was issued to the National Safety Council, it was decided to hold the Safety Conference under the auspices of both the Industrial Accident Commission and the National Safety Council through its San Francisco Local Council. The Conference was held in the Civic Auditorium, San Francisco, September 27–30, 1915.

The Commission's exhibit booth at the Exposition was awarded a silver medal by the Jury of Awards.

Following competitive civil service examinations, the inspecting force of the Safety Department was increased from five to nine by the addition of one construction engineer, one elevator inspector and two boiler inspectors.

During the year the Safety Department visited 1,589 places of employment, distributed as follows:

Number of plants	Character of industry	Number of employees affected
449	Metals and machinery	4,209
229	Laundries, dyeing establishments, etc.	5,240
202	Lumber and its products	18,281
173	Construction	7,732
144	Miscellaneous	1,043
141	Foodstuffs	6,042
59	Mercantile	2,300
35	Institutions, buildings, etc.	438
30	Public corporations, municipal water plants, etc.	6,235
21	Brick, tile, pottery, etc.	1,221
18	Paper, printing, etc.	222
12	Oil industry, asphalt paving, etc.	1,101
6	Transportation, railroad, etc.	3,940
1,589		58,004

Numerous reinspections were made to see that the safety recommendations were carried out.

In addition to the above list it is to be noted that 412 boiler inspections were made, as well as 620 air pressure tank and 87 elevator inspections. A number of accident cases were investigated.

Emphasis has been laid at all times on the importance of organizing plant safety committees. That this matter has been given serious consideration is attested by the following partial list of safety committees which are now well organized and active in preventing industrial accidents:

American Olive Co., Los Angeles, Cal.; Banning Canning Co., Banning, Cal.; Bayside Lumber Co., Eureka Cal.; Benson Lumber Co., San Diego, Cal.; Bishop & Co., Los Angeles, Cal.; Brownstein-Louis & Co., Los Angeles, Cal.; California Industrial Co., Los Angeles, Cal.; Union Lumber Co., Fort Bragg, Cal.; Kullman, Salz & Co., Benicia, Cal.; Southern Pacific Co., San Francisco, Cal.; Golden Eagle Milling Co., Petaluma, Cal.; Golden State Canning Co., Ontario, Cal.; Humboldt

Cooperage Co., Arcata, Cal.; Great Western Milling Co., Los Angeles, Cal.; Griffin Steel Co., Los Angeles, Cal.; Hercules Powder Co., Hercules, Cal.; Hotpoint Electric Heating Co., Ontario, Cal.; Johnson Foundry and Machine Co., Los Angeles, Cal.; Lane & Bowler Corporation, Los Angeles, Cal.; Key Route-Oakland Terminal Railways, Oakland, Cal.; Los Angeles Can Co., Los Angeles, Cal.; Los Angeles Planing Mill, Los Angeles, Cal.; Los Angeles Soap Co., Los Angeles, Cal.; Los Angeles County Repair Shops, Los Angeles, Cal.; McCloud River Lumber Co., McCloud, Cal.; Moreland Motor Truck Co., Los Angeles, Cal.; McKay & Co., Eureka, Cal.; Northern Electric Railway Co., Sacramento, Cal.; Northern Redwood Lumber Co., Korbel, Cal.; Pacific Light and Power Corporation, Los Angeles, Cal.; Pacific Gas and Electric Co., San Francisco, Cal.; Pacific Telephone and Telegraph Co., San Francisco, Cal.; Pasadena Manufacturing Co., Pasadena, Cal.; Pacific Sash and Door Co., Los Angeles, Cal.; Pacific Lumber Co., Los Angeles, Cal.; Pacific Electric Railway Co., Los Angeles, Cal.; General Petroleum Co., Los Angeles, Cal.; Standard Oil Co., El Segundo, Cal.; Savage Tire Co., San Diego, Cal.; Sierra Nevada Wood and Lumber Co., Hobart Mills, Cal.; Steiger Terra Cotta and Pottery Co., Mills Building, San Francisco, Cal.; Diamond Laundry, Los Angeles, Cal.; P. A. Newmark & Co., Los Angeles, Cal.; Edison Electric Co., Los Angeles, Cal.; Standard Portland Cement Co., Napa Junction, Cal.; Salt Lake Roundhouse, Salt Lake tracks, Los Angeles, Cal.; Southern Sierras Power Co., Riverside, Cal.; Montebello Oil Co., Fillmore, Cal.; California Barrel Co., San Francisco, Cal.; Natomas Company of California, Natoma, Cal.

During the year a special investigation was conducted by two of the safety engineers into the problems in connection with preventing accidents in the logging and sawmill industry, and a set of tentative logging and sawmill safety orders were issued in the early months of 1916, for discussion with the various lumbering concerns during the visits of the safety engineers. A committee representing both employers and employees of sundry lumber companies operating sawmills will later meet with the Commission's representatives to draft safety orders for presentation at public hearings.

A very important part of the safety department's work has been in moving the location of and enlarging the Safety Museum in San Francisco.

In January, 1916, an opportunity was offered of securing the whole ground floor of 529 Market street, one of the store spaces of the Underwood Building. The Safety Museum was thereupon moved to the new location, where ample room is afforded for displaying the increasing number of interesting exhibits of safety devices, which now total 115.

The Safety Museum in Los Angeles is situated on the fourth floor of the Union League Building, this being the same floor as that on which the offices of the Industrial Accident Commission are located.

A set of seven cardboard construction bulletins were issued to building contractors throughout the state, and by means of illustrations showing hazardous conditions which can readily be eliminated, have served to educate both employers and employees in safety first principles. These bulletins are posted in conspicuous places on construction jobs.

Cloth bulletins were also issued, calling attention to safe practices in boiler rooms, and another set giving instructions in the storage and use of explosives.

Throughout the school year the travelling exhibit of safety appliances which the Commission prepared was sent to a large number of schools by the Extension Division of the University of California. Pupils were required by their teachers to write safety essays after studying the exhibit, thus gaining an idea of "Safety First" which we may confidently expect to bear fruit.

MINING DIVISION.

Following were the outstanding features of the work of the Mining Division during the fiscal year ended June 30, 1916:

Adoption of the Mine Safety Rules by the Industrial Accident Commission.
Inauguration of a safety campaign among mine operators and miners.
Inspection of a total of 355 mines, quarries and dredges.
Training of 711 miners in first aid to the injured.

As in the previous year, the work of the Mining Division was carried on in cooperation with the federal government. Under this arrangement the work of mine inspection is carried out under the supervision of a mining engineer of the United States Bureau of Mines.

On September 25, 1915, the fourth public hearing was held on the Mine Safety Rules, and on October 13, 1915, a final draft of the rules was prepared to present to the Industrial Accident Commission. This final draft was adopted by the Commission on November 1, 1915, and became effective January 1, 1916.

Up to the end of the fiscal year, no difficulties were experienced in the administration of the Mine Safety Rules. That the new system was not burdensome to mine operators is evidenced by the fact that a total of only twelve exemptions from the rules were asked for and granted. The mine operators of the state evidenced a sincere desire to cooperate with the Mining Division in its work. While it is too early to make definite statements regarding the effect of the mine rules, it is significant that the statistics of fatal accidents, given on page 63, show an appreciable reduction as compared with the figures of the previous year.

The first half of the year's work was carried on under the supervision of H. M. Wolflin, who was assigned on January 1, 1914, to the work of investigating conditions and preparing the Mine Safety Rules. Mr. Wolflin at that time was a mining engineer of the U. S. Bureau of Mines. On January 1, 1916, Mr. Wolflin was promoted to the position of Mine Safety Engineer of the Bureau of Mines and was succeeded by Edwin Higgins, who was given the title of Chief Mine Inspector.

Mine Inspection Work.

During July, 1915, G. Chester Brown and J. W. Gebb were permanently appointed deputy mine inspectors. On September 1, F. L. Lowell received a similar appointment. During the first half of the fiscal year these deputies inspected 200 mines which employed a total of 8,000 men. More than 1,400 suggestions for safety were made as a result of these inspections.

On the adoption of the Mine Safety Rules on January 1, 1916, it became necessary to so systemize the mine inspection work that none of the requirements of the rules would be overlooked. The office system was changed somewhat and mine inspection blanks were put in use. It became necessary to spend more time on inspections than had hitherto been devoted to this work. During the second half of the fiscal year, complete inspections were made of 155 mines; 15 fatal accidents were investigated and reports made thereon; numerous partial mine inspections were made in connection with requests for exemption from the Mine Safety Rules, and for other purposes.

The Safety Campaign.

Early in 1916 a safety campaign was inaugurated. This embraced the issuance of bulletins to mine operators on safety and efficiency in mining, and the organization of what is known as the Miners' Safety Bear Club. Problems and matters of interest relating to safety and efficiency in mines were discussed in the bulletins. In addition, there was published, at the end of each bulletin, a list of sketches and clippings relating to safety and efficiency which could be obtained free of charge by California mine operators. Up to the end of the fiscal year, 285 blue prints and photostat copies of these sketches, and 300 of the clippings had been mailed to operators of the state.

In an attempt to secure the cooperation of California miners in the work of accident prevention, a letter was written and sent to practically every miner in the state. The purpose was to establish a channel through which the miner could be appealed to directly. By the end of the fiscal year more than 5,000 miners had joined the Safety Bear Club and four letters, containing matter relating to safety and welfare, had been mailed to each member. The Safety Bear Club has no officers, constitution or by-laws, and its members are not required to pay dues. Each member wears what is known as a Safety Bear Button. Judging by the interest displayed by miners in this movement, it is believed that considerable good will result.

First Aid to the Injured and Mine Rescue Work.

During the year, first aid and rescue training was given in California by Geo. W. Riggs, S. C. Dickinson, and Joseph Woods, of the U. S. Bureau of Mines; and by Messrs. Brown and Lowell, deputy mine inspectors. The complete course of first aid training was given to 281 miners; 430 were partially trained. Mine rescue training was given to 15 miners. The fact that oxygen breathing apparatus were not installed at the mines until well toward the end of the year accounts for the small number of men trained in mine rescue work. Oxygen breathing apparatus were installed at mines employing more than 30 men on one shift. In Amador County a cooperative rescue station was established.

In August, 1915, a first aid contest was held at Jackson, in Amador County, four teams participating. In September, the state and national mine rescue work and first aid contest was held in San Francisco. Nine first aid teams and one mine rescue team from California participated, as well as 16 first aid teams and 11 mine rescue teams from other states. The participants in this contest came frcm as far east as West Virginia and Illinois, and as far north as Alaska. Approximately 100 mining companies were represented and about 170 men comprised the contesting teams. This meet was financed by the California Metal Producers Association, which contributed about $1,250. The Panama-Pacific Exposition Company contributed $100. Toward the end of the fiscal year arrangements were well in hand for preliminary first aid contests at Nevada City and Kennett, and for the second annual California contest to be held at Sacramento, September 6, 1916.

STATISTICAL REPORT.

Time Covered by this Report.

This report concerns itself chiefly with the 67,538 industrial injuries which occurred during the year 1915. However, in many of the charts and tables the figures of 1914 are included to facilitate comparison. Also, a general statement has been made of the 40,269 injuries occurring during the first six months of 1916, and the industries wherein they happened.

What to Remember When Reading These Figures.

It must be remembered when reading these figures that they do not contain all the factors which would render them bases for safe conclusions. The number of working men and working women employed in this state is still an unknown quantity.

Number of Employees in State.

The last United States census places the number above the million mark; others have made estimates of six hundred thousand to eight hundred thousand employees. If we assume that the experience in this state is similar to that of Europe and the number of injuries reported during the first six months of 1916 is normal, the estimate of the United States census for 1910 is perhaps the better guide.

No Bureau for Determining Exposure and Experience.

There is no bureau with sufficient power to collect and compile this data. The nearest approach to anything of this kind is found in the office of the State Insurance Commissioner which receives pay roll statements or their equivalents from the companies writing compensation insurance.

Only a Little More Than Half of Injuries Covered by Insurance.

But only about two-thirds of the injuries occurring in the state are protected by insurance companies, privately owned, or by the State Fund, and it is safe to say that many of the most hazardous employments are not included in this number, which renders calculations, based on this experience and exposure, only partially true.

On the other hand, two of the largest groups of employees are engaged in interstate commerce and agriculture and are exempted from the compensation provisions of the Act, unless the injured employee be engaged in some occupation which is disconnected with interstate commerce in the first instance, or in the second instance, a farm employee whose employer has voluntarily accepted the provisions of the Workmen's Compensation Act. About nineteen per cent (18.99%) of all the *injuries* reported in 1915 were injuries to employees of these two mentioned classes. Allowing, therefore, that two-thirds of all the injuries to farm employees which are reported are injuries subject to the Act's compensation provisions, and that only a negligible number of the injuries to interstate employees are in this class, then only about eighty-four and one-half per cent (84.5%) of the industrial injuries occurring in this state are compensable according to the terms and provisions of the Compensation Act. Basing the probable number of employees engaged in these two exempted groups on the conservative estimate for this state that one out of every twelve workmen is injured, we have 125,000 employees who are without the pale of the Act.

It is important to keep these three things in mind when analyzing these figures:

(1) That no method or means is yet available to calculate the number of employees working in given occupations and at given times in this state.

(2) That only 66.34 per cent of the injured are covered by private or state insurance.

(3) That only 84.5 per cent of the industrial injuries in the state are covered by the Act.

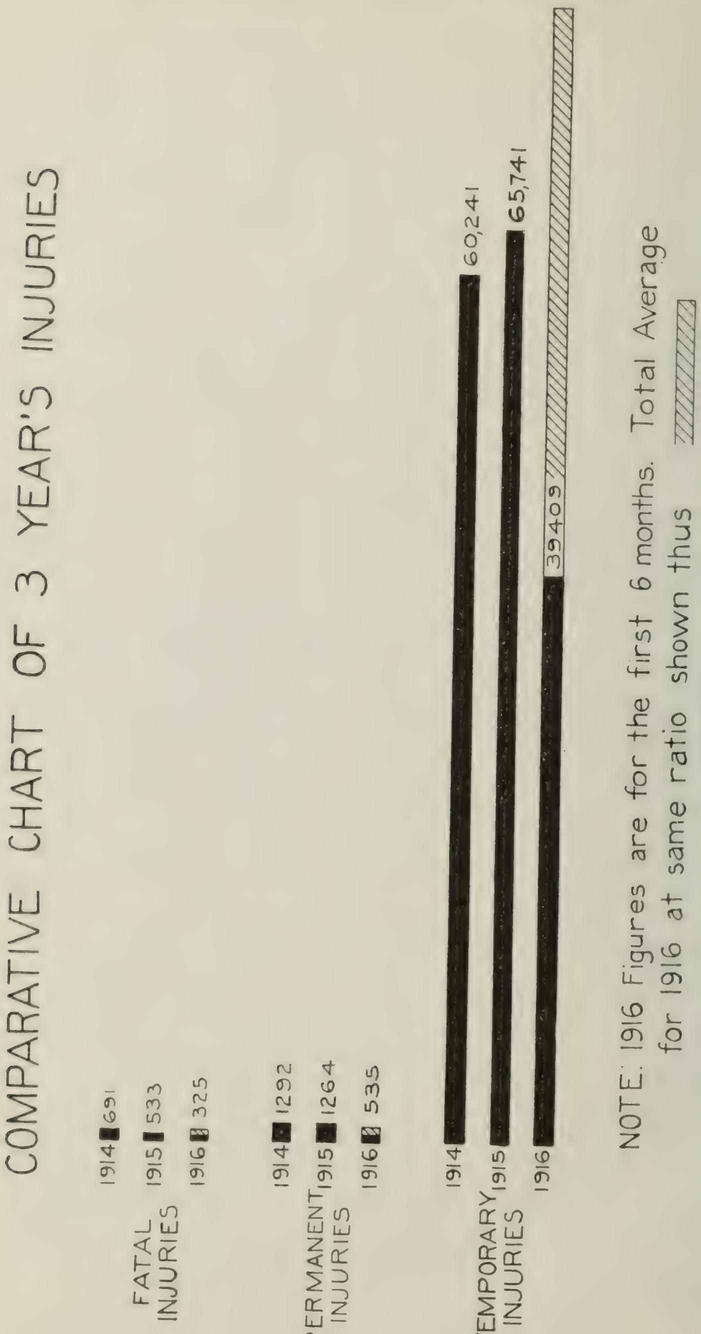
Increase in Injuries Reported for First Six Months of 1916.

Attention is called to chart No. 1, which shows an increase of 5,314 injuries reported in 1915 over 1914, and a very much larger average increase of reporting for 1916 over both the preceding years.

This increase, however, is confined principally to the temporary injuries and may be accounted for in several ways. It may be due to a wider understanding by employers of their obligations under the law, or to an increase in the number of workers during 1916 due to increased activity in industry throughout the state. It is not likely that it is due to any percentage increase in the number of injuries which do occur yearly in the state, whether reported or unreported.

Turning to the serious injury cases, it will be noted that there seemed to be a substantial decrease in the number of deaths for 1915 over 1914, while the number of permanent injuries remained close together for both years. But the 1916 figures for the first six months show a decided average increase in the fatal injuries over 1915. This is explained in part by the frightful disasters at sea during the early months of 1916. It is probable that the number of industrial deaths occurring on coastwise vessels during the months mentioned will total 55. This number is not definitely fixed, due to the status of some of the cases being still in question before the Commission and the courts on the issue of jurisdiction.

Before concluding our conjectures as to the decreases and increases in the number of injuries, we would like to call attention to the fact


COMPARATIVE CHART OF 3 YEAR'S INJURIES

NOTE: 1916 Figures are for the first 6 months. Total Average for 1916 at same ratio shown thus ▨

Chart No. 1.

INDUSTRIAL ACCIDENT COMMISSION
OF THE
STATE OF CALIFORNIA

ANALYSIS AND COMPARISON OF CALIFORNIA'S INDUSTRIAL INJURY EXPERIENCE FOR THE TWO CALENDAR YEARS, 1914 AND 1915 NUMBER OF TEMPORARY INJURIES OCCURRING IN 1914, — 60,241, IN 1915, — 65,741; FATAL AND PERMANENT INJURIES NOT CONSIDERED

CORRELATION OF CAUSES WITH NUMBER OF INJURIES, TIME LOST, COMPENSATION PAID AND MEDICAL COSTS

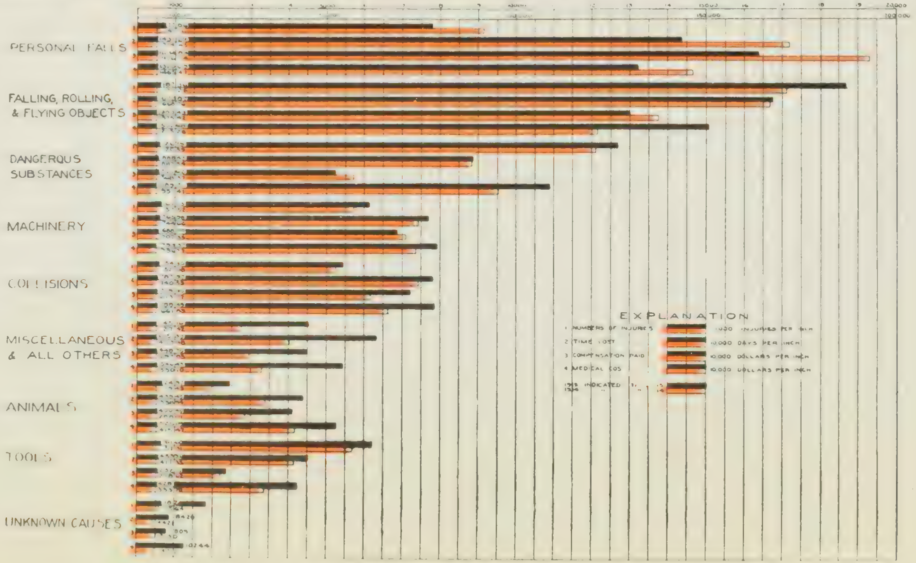


Chart No. 2.

that the years of 1914 and 1916 are signalized for their industrial activity; 1914 was the year in which the most hazardous part of the construction work of the Exposition was done; 1916 is marked for a general increase in manufacturing activity, perhaps due in some measure to the European conflict. There are no figures upon which to base the assumption that 1915 was a less active year industrially than 1914 or 1916, other than estimates of contracts and construction plans, etc., which were a source of general complaint during the year 1915. It was also a general sentiment that eastern activity due to the war had hardly been reflected in the West till early in 1916.

So in spite of these uncertainties of data, marine catastrophies, expositions, wars and the general increase of injuries reported in 1915 over 1914, we are unable to explain why there is such a slump in the number of temporary injuries due to the workmen falling from elevations, etc., together with a consistent decrease in all three of the other factors of (1) time lost due to the injury, (2) amount of compensation required by law, (3) medical fees for recovery from such injuries. This decrease can not be attributed solely to the absence of construction work done in 1915 as can be seen from the fact that while there was a decrease during 1915 of 1,282 temporary injuries in construction work, only 426 of these injuries were due to the workmen falling, leaving 895 ''personal fall'' injuries distributed through the other industries in which there was a general increase in injuries reported.

The decrease in personal fall injuries in 1915 reduced the compensation and medical costs paid in such cases, $42,956.98, while in every other instance there was a general increase in compensation and medical costs.

Safety.

From the foregoing it would seem that the ''safety first'' idea was boring, logically, into the human side of the problem, engendering a spirit of caution which will produce the proper results.

Chart No. 2.

A close study of chart No. 2 should be made in connection with the foregoing. This chart compares the 1914 with the 1915 experience respecting (1) the number of injuries due to any chief cause in the respective years, (2) the time lost in each year due to the chief cause, (3) the compensation, (4) and medical costs by chief cause. The small numbers 1, 2, 3 and 4 refer to the position on the chart of the foregoing items as they occur under each main cause group. The solid black line refers to 1915 experience. The scale is not exactly true, as it suffered in photographic reduction. The number of injuries per each main cause, the days lost in time, and the costs, appear in the broken part of the lines. For further analysis of this chart, see tables in the back of the report.

Some Salient Points of the Year's Experience.

There are close to one million wage earners in this state. Sixty-seven thousand five hundred thirty-eight injuries to employees of this number were reported during 1915.

Five hundred thirty-three of these injuries proved fatal.

Twelve hundred sixty-four left some permanent effect upon the injured workman.

The remaining 65,741 injuries, though causing only temporary disability, caused a loss of time equal to 2,380 years; 13,244 workmen were disabled fifteen days or more.

The wage loss to workmen due to these temporary injuries amounted to $2,142,000. For all injuries, the wage loss created in 1915 by industrial injury ran close to $18,250,000.

The total compensation paid to injured workmen or their dependents in the 67,538 cases was $1,150,503.56. The payments to physicians, hospitals, etc., for these injuries amounted to $852,202.48, or a grand total of compensation and medical payments of $2,002,706.04.

Seven hundred thirty-nine people were either totally or partially dependent for support upon the deceased employees; 247 of this number were wives and 379 were children.

Of the 1,264 injuries leaving permanent effects on injured, the following are typical:

One hundred seventy-five eyes suffered an impairment of the vision or removal of the eye. (This was also true of 172 eyes during 1914.)

Thirteen arms of workmen were amputated in 1915 and 28 in 1914.

Twenty-eight legs or feet were cut off in 1915 as against 45 in 1914.

Forty toes were lost in 1915 as against 54 in 1914.

There were 10 curvatures and contractions of different members of the body in 1915 against 11 in 1914.

The most striking regularity occurs in the amputation of fingers:

	1915.	1914.
Loss of one finger	422	482
Loss of two fingers	79	81
Loss of three fingers	35	30
Loss of four fingers	12	18
Loss of five fingers	4	3
Loss of some and stiffness of rest	45	51

For further study of these injuries see the manikin chart No. 3, also table of permanent injuries in back of report.

OCCUPATIONAL DISEASES.

The Workmen's Compensation, Insurance and Safety Act as amended effective August 8, 1915, provides this Commission with the power to require reports of occupational diseases and industrial injuries to employees in the state of California.

Since this amendment became effective, the Statistical Department has received reports in the following cases which are likely to be classed as occupational diseases or injuries:

Pneumonia*	3	Anthrax	2
Typhoid	2	Metal poisoning	1
Diphtheria	1	Mercurial poisoning	2
Ptomaine poisoning	1	Sulphur poisoning	1
Lead poisoning	10	Lumpy-jaw	1
Pleurisy	2	Poisoning resulting from handling hops which are used in the manufacturing of malt liquors	425
Tuberculosis	1		
Neurosis	1		
Heat exhaustion	1		

*One of these was fatal.

The Commission may reject many of these cases as not arising out of or occurring during the course of employment, after the facts in each case have been thoroughly reviewed. However, until the Commission reaches a decision these cases received from employers who were in doubt as to the status of the case, will be included in the records of this department as bona fide cases of occupational diseases.

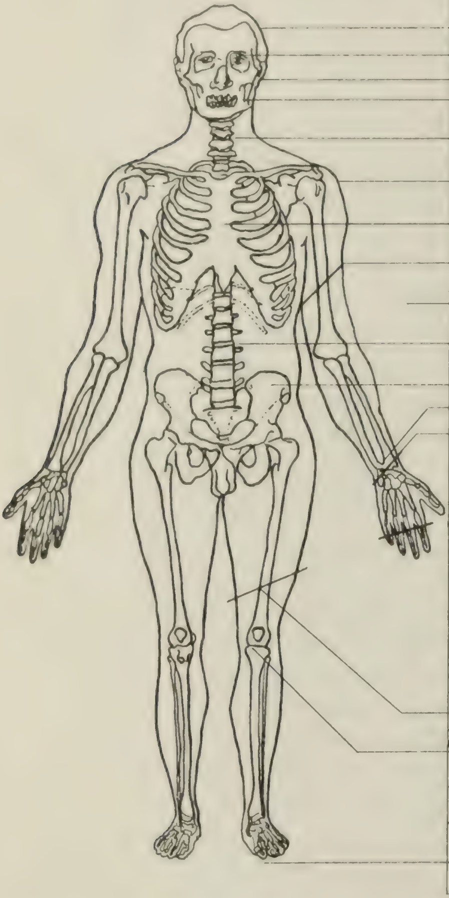
A Statement of Compensation and Medical Payments in the 67,538 Injury Cases During 1915.

Reports of payments to injured workmen or to physicians for their services were not included in the totals of this report if they reached the Commission after June 30, 1916. Except in the comparatively small number of fatal and permanent injury cases where payments were commuted to lump sums at the request of the insurance company, or of the injured or dependent, the payments in these cases extend over a period of from four and one-half years from date of injury to the death of the injured workman in some cases. The caution required in concluding upon figures, averages, etc., in connection with figures of fatal and permanent injuries, need not be exercised in the case of temporary injuries—as nearly ninety-eight per cent (97.7%) of the temporary cases were closed in time for tabulation.

Compensation and Medical Payments.

Total payments of compensation and medical benefits		$2,002,706 04
(1) 533 fatal injuries	$239,288 36	
(2) 1,264 permanent injuries, including 13 pension cases	451,223 76	
(3) 65,741 temporary injuries	1,312,193 92	

CHART OF 1264 INJURIES IN 1915 AND 1292 INJURIES IN 1914 RESULTING IN PERMANENT DISABILITY GROUPED BY PART OF BODY AFFECTED



GROUP INJURIES	NUMBER IN GROUP 1915	NUMBER IN GROUP 1914
SKULL	6	3
EYES	175	172
EARS	11	9
FACE	6	5
NECK	1	2
BURNS OF BODY	2	4
CHEST	1	2
ARM AMPUTATIONS	13	28
ARM ANKYLOSIS *	36	42
SPINE	14	17
PELVIC REGION	1	3
WRIST ANKYLOSIS	34	30
ONE HAND AMPUTATIONS	7	12
BOTH HANDS AMPUTATED	0	1
ANKYLOSIS OF FINGERS *	154	100
AMPUTATION OF 1 FINGER	422	482
AMPUTATION OF 2 FINGERS	79	81
AMPUTATION OF 3 FINGERS	35	30
AMPUTATION OF 4 FINGERS	12	18
AMPUTATION OF 5 FINGERS	4	3
COMB. LOSS & ANKYLOSIS OF FINGERS	45	51
CURVATURE & CONTRACTURE	10	11
FOOT AMPUTATIONS	9	0
LEG AMPUTATIONS	19	45
FOOT INJURIES *	24	0
ANKYLOSIS OF JOINTS OF LEG	49	63
MULTIPLE INJURIES	13	18
MISCELLANEOUS INJURIES	14	6
TOE AMPUTATIONS	40	54
UNCLASSIFIED	28	0
TOTAL	1264	1292

NOTE - In 28 Unclassified Injuries for 1915 the exact nature and degree of permanent impairment is still undetermined.
*Groups marked thus include limitation of motion, loss of function, etc.

Chart No. 3.

Medical Payments.

Total payments for medical, surgical and burial benefits		$852,202 48
(1) 533 fatal injuries	$36,001 89	
(2) 1,264 permanent injuries	106,485 67	
(3) 65,741 temporary injuries	709,714 92	

Compensation Payments.

Total payments to injured or dependents		$1,150,503 56
(1) To dependents in 313 fatal injury cases	$203,286 47	
(2) 1,264 permanent injury cases	344,738 09	
(3) 65,741 temporary injury cases	602,479 00	

Regularity of Ratios in Payments, etc.

From the foregoing statement of payments and also from the graphic chart which follows, it will be seen that there is a striking regularity or consistency of ratios between (1) the total medical payments to the total compensation payments in the years of 1914 and 1915; (2) the medical payments to compensation payments according to the character of the injury for both years; (3) the number of injuries under insurance and not under insurance; and (4) the disbursements.

Increase in Medical Costs for 1915.

The upper half of the circles on chart No. 4 shows a slight increase in 1915 over 1914 of the percentage of medical payments,—the medical costs in 1915 being 42.55 per cent of the total payments made as against 39.20 per cent for 1914, an increase of 3.35 per cent.

Percentage of Injuries Covered by Insurance.

Something has been said previously concerning the number of injuries which are covered by insurance, but not in connection with 1914 figures which show the fixedness between the lines of insurance and noninsurance. Sixty-six and thirty-four hundredths per cent (66.34%) of the injuries were covered in 1915 and sixty-six and twenty hundredths per cent (66.20%) in 1914.

Payments by Insurance Companies and Companies not Carrying Insurance.

Considering the total money paid to physicians, injured workmen or their dependents, insurance companies sustained seventy-three and seven hundredths per cent (73.07%) of it, and employers who could not or preferred not to insure, sustained the remaining twenty-six and eighty-one hundredths per cent (26.81%). Nearly the same conditions existed in 1914 as will be noted from the chart No. 4, where insurance companies shouldered seventy per cent (70.04%) of the losses and noninsuring employers shouldered thirty per cent (29.96%).

Payments Proportioned by Character of Injury.

Combining the losses paid by both insurance companies and noninsuring employers and proportioning the payments for physicians, hospitals, etc., and the payments to injured workmen who received only temporary injuries we find that fifty-four per cent (54.08%) of the total losses due to this class of injury went to physicians and hospitals while forty-six per cent (45.91%) went to the workmen.

In the 1,264 cases of permanent injuries, twenty-three and one-half per cent (23.59%) of the losses incurred due to this class of injuries went to the physician and hospitals and seventy-six and one-half per cent (76.4%) went to the injured workman. It must be borne in mind, however, that this condition will change in these cases as the compensation payments will extend over many years in some cases while the medical costs will not be materially increased.

There is little need for medical aid over a long period of time in case of fatal injuries. Only burial costs are required in the majority of cases of this kind. One notable exception, however, occurred in the northern part of the state where a workman lingered ten or eleven months from a mortal wound. The medical and surgical bill in this case was $819.60 and burial expenses amounted to $245.

Usually where there are dependents left and an award is made no specific mention is made in the report of final settlement of the amount expended by the dependents for burial rites. Where no dependents are left, however, the usual amount allowed is $100. This accounts for the comparatively low figures given herein for medical and burial benefits. Burial benefits amounted to fifteen per cent (15.05%) of the total losses paid for fatal injuries occurring in 1915 and reported as paid up to June 30, 1916. Eighty-five per cent (84.95%) of this total went to dependents. With the exception of a minor portion of the cases where dependents required a lump sum settlement, this percentage will be greatly increased in the succeeding four and one-half years.

Percentage of the Total Losses Paid in 1915 for Compensation and Medical Services for Each Injury Class.

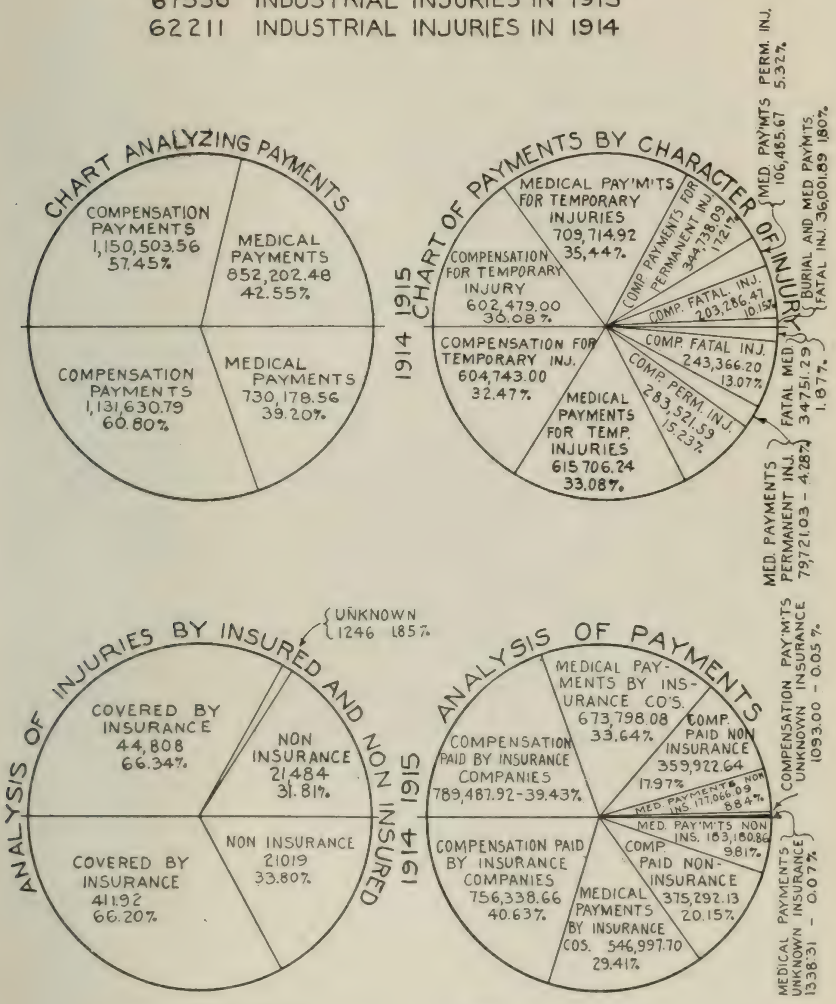
Looking at the problem from another angle we see that the total losses paid in 1915 which amounted to $2,002,706.04 were distributed in the following manner:

(1) For compensation in fatal injury cases	10.15 per cent
(2) For compensation in permanent injury cases	17.21 per cent
(3) For compensation in temporary injury cases	30.08 per cent
(4) For medical services in fatal injury cases	1.80 per cent
(5) For medical services in permanent injury cases	5.32 per cent
(6) For medical services in temporary injury cases	35.44 per cent
Total	100.00 per cent

Seen in this light, the largest item of the year's total losses paid for industrial injuries was medical services to cure and relieve men suffering from injuries which have no permanent effect. Second in importance is the payment, to these same men, of compensation for time lost by them.

INDUSTRIAL INJURIES

INCLUDING FATAL AND PERMANENT INJURIES
67538 INDUSTRIAL INJURIES IN 1915
62211 INDUSTRIAL INJURIES IN 1914



SUMMARY

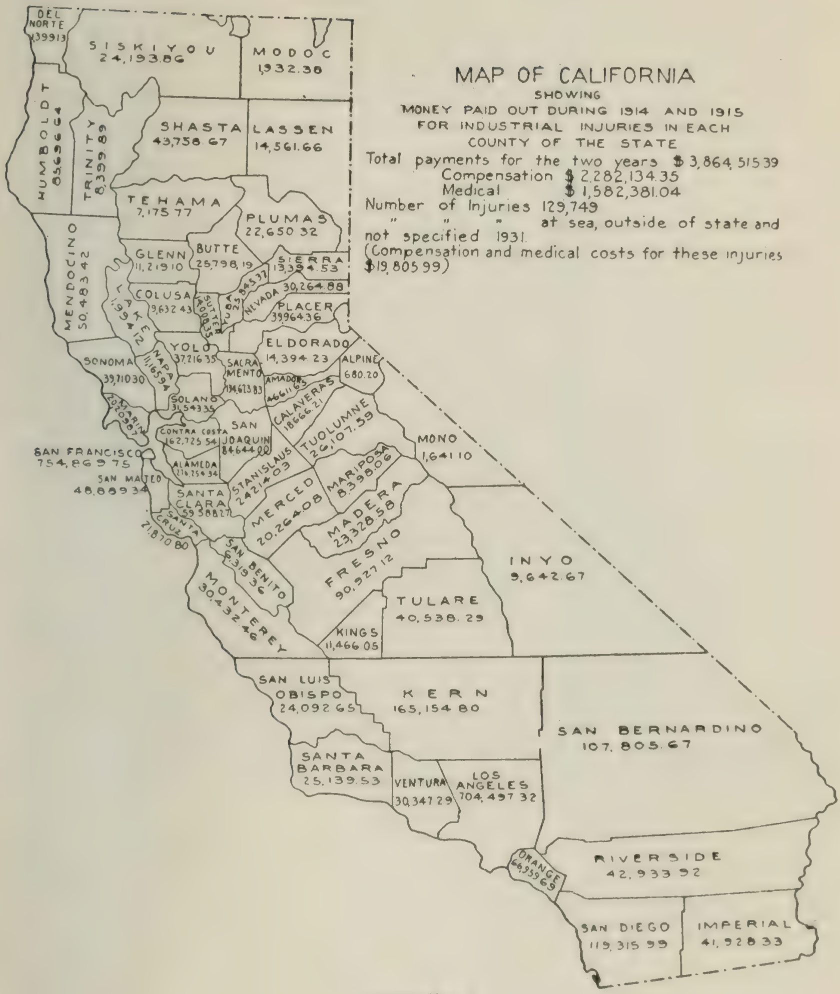
	1915		1914	
TOTAL INSURANCE CO. PAYMENTS	1,463,286.00	73.07%	1,303,336.36	70.04%
" NON INSURANCE "	536,988.73	26.81%	558,472.99	29.96%
" UNKNOWN INS. "	2,431.31	.12%	———	
TOTALS	2,002,706.04		1,861,809.35	

Chart No. 4.

MAP OF CALIFORNIA.

Chart No. 5 shows how the money paid out in compensation and for medical services, due to industrial injuries occurring in the twenty-four months of 1914 and 1915, was spread out over the state into every county. During these twenty-four months, a total of $3,864,515.39 was distributed throughout the state to workmen and physicians; $2,282,134.35 going to the injured men, and $1,582,381.04 going to the physicians, hospitals, etc. This money covered in part the losses arising out of 129,740 industrial injuries for twenty-four calendar months. Of the total paid during these two years, $754,869.75 was paid to employees and physicians in the county of San Francisco, and $704,497.32 went to employees and physicians of the county of Los Angeles. Alpine County, with a population of about 400 inhabitants, came in for $680.20 of this total, as a result of seventeen accidents for the two years, nine of which occurred in 1914, and eight in 1915. Two counties, San Francisco and Los Angeles, each had an injury experience for these two years of 20,000 and more injuries, and thirteen other counties each had an injury experience of not less than 2,000 and not more than 20,000 injuries for the twenty-four months. These last mentioned fifteen counties represent the chief centers of industrial activities throughout the state—for the middle part of the state, or central part of the state—San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, San Joaquin, Sacramento, Nevada and Fresno.

In the northern part of the state, Humboldt County is the only county in which 2,000 to 20,000 injuries were reported for the two years. In the southern part of the state, Los Angeles comes first, Kern second, San Diego third, San Bernardino fourth and Orange fifth. All the remaining counties of the state had less than 2,000 injuries during the twenty-four calendar months of 1914–1915.



MAP OF CALIFORNIA
SHOWING
MONEY PAID OUT DURING 1914 AND 1915
FOR INDUSTRIAL INJURIES IN EACH
COUNTY OF THE STATE

Total payments for the two years $ 3,864,515 39
Compensation $ 2,282,134.35
Medical $ 1,582,381.04
Number of Injuries 129,749
" " " at sea, outside of state and not specified 1931.
(Compensation and medical costs for these injuries $19,805 99)

Chart No. 5.

533 FATAL INJURIES IN 1915.

There were twenty-two and eight-tenths per cent (22.8%) fewer men killed in California's industries during 1915 than in 1914. As has been said already, this may be due to many different factors which slowed industry up for the year, but whatever it was, the effect was so general that every industry, with one exception, in the state was affected as respects an actual reduction in the number of employees killed. And with one exception the experience for 1916 appears to be better than 1914 although it may exceed the experience of 1915. This may be expected where such small numbers are involved and which can be greatly affected by one catastrophe on sea or land. If the industries of the state increase their activities, the actual number of men killed may be greatly increased and still be considered a reduction in the number of workers killed per thousand employed. This will always be a matter of some doubt till some way is opened to determine an "exposure" to the hazards of the state's industries. Another important item to keep before us is that the population in this state is increasing from year to year at the rate of about four to four and one-half per cent and this feature alone will operate against a very great and general reduction in the number of injuries yearly. There will be a source for satisfaction if the number of injuries is kept from increasing, leaving a reduction out of the question. The following table compares the fatalities for thirty calendar months—1914, 1915 and six months of 1916—by the industries in which the injuries happened:

Industry	1914	1915	Six months, 1916
All agricultural pursuits	62	55	20
All forms of construction work	115	78	36
Mining of minerals and oil, also stone and rock quarrying	86	71	31
Manufacturing	121	99	54
Businesses which sell only a form of service and which do not manufacture, produce or dispense commodities	24	25	19
Mercantile trades (commercial)	24	20	5
Transportation (steam and waterways), also, public utilities	239	172	140
Unknown industry	20	13	2
Unclassified as yet			18
Totals	691	533	325

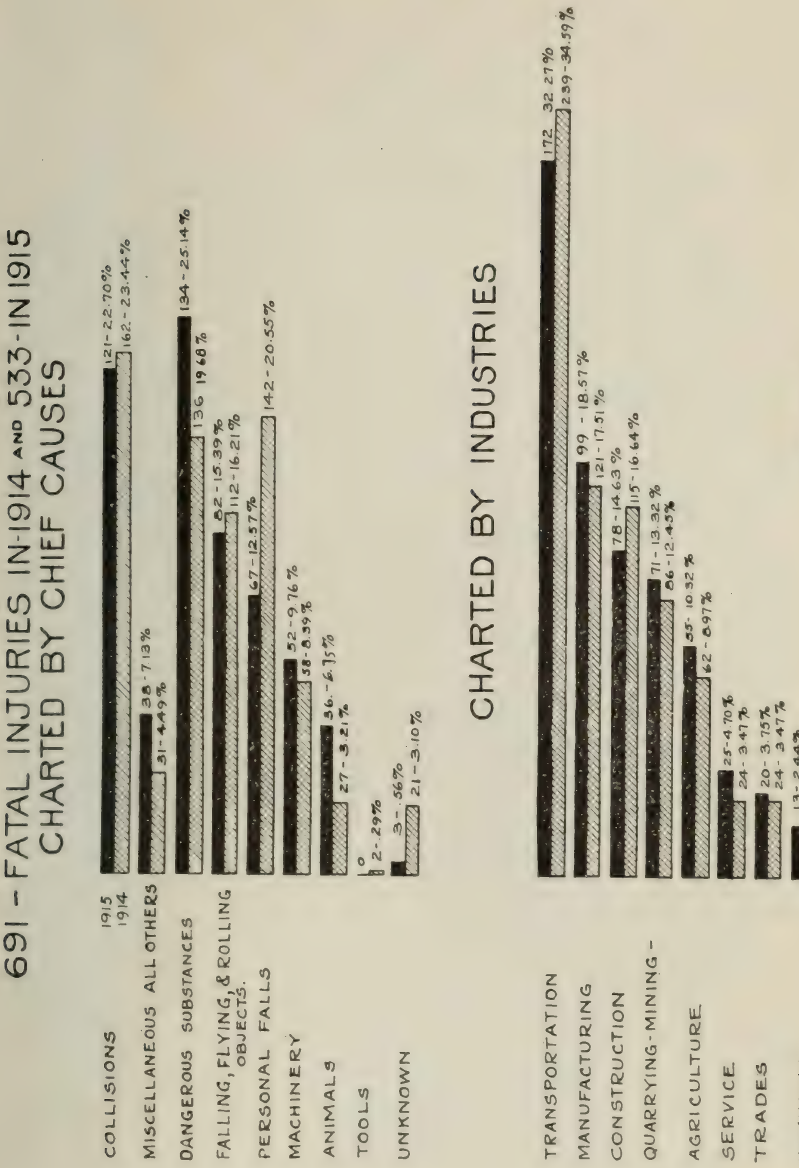

691 - FATAL INJURIES IN 1914 AND 533 - IN 1915
CHARTED BY CHIEF CAUSES
1915
1914
COLLISIONS
121 - 22.70%
162 - 23.44%
MISCELLANEOUS ALL OTHERS
38 - 7.13%
31 - 4.49%
DANGEROUS SUBSTANCES
134 - 25.14%
136 19.68%
FALLING, FLYING, & ROLLING OBJECTS.
82 - 15.39%
112 - 16.21%
PERSONAL FALLS
67 - 12.57%
142 - 20.55%
MACHINERY
52 - 9.76%
58 - 8.39%
ANIMALS
36 - 6.75%
27 - 3.21%
TOOLS
0
2 - .29%
UNKNOWN
3 - .56%
21 - 3.10%
CHARTED BY INDUSTRIES
TRANSPORTATION
172 32.27%
239 - 34.59%
MANUFACTURING
99 - 18.57%
121 - 17.51%
CONSTRUCTION
78 - 14.63%
115 - 16.64%
QUARRYING - MINING -
71 - 13.32%
86 - 12.45%
AGRICULTURE
55 - 10.32%
62 - 8.97%
SERVICE
25 - 4.70%
24 - 3.47%
TRADES
20 - 3.75%
24 - 3.47%
UNKNOWN
13 - 2.44%
20 - 2.90%

Chart No. 6.

Chart No. 6 compares the 533 fatal injuries of 1915 with the 691 fatal injuries of 1914 by the chief industry and cause groups responsible. The solid top line is for 1915 and the cross hatched line is for 1914. The length of the lines are determined on a percentage basis which is the number of fatal injuries for each year. Unless this is realized it will be confusing in some instances.

Dependents Left in 533 Fatal Injury Cases in 1915.

Seven hundred thirty-nine people who were dependent on workmen and workwomen to feed, clothe and shelter them, had this support taken from them during 1915, due to about 313 accidents. Six hundred forty-one of this number were totally dependent upon the deceased. Ninety-eight others were not adjudged as being in this class, but yet having some need for additional help to keep them. This latter class is composed chiefly of aged fathers and mothers, invalid brothers and sisters or relations left to the care of the workman's family by others who are gone. There were 379 children left totally dependent, and experience collected by this Commission shows that the average age of such children is around nine years.

There was an 8.4 per cent increase in the number of married men killed in 1915 over 1914, but a reduction of 16 in actual number. The percentage of cases where no dependents were left remained about the same for the past two years. Chart No. 7 may be studied with profit in this connection.

533 FATAL INJURIES.

Dependents in 313 of the 533 Industrial Death Cases.

Number of total and partial dependents		739
Total dependents	641	
Partial dependents	98	

Relationship of 641 Total Dependents.

Wives			247
Children			379
Sex	Male	173	
	Female	158	
	Unknown	48	
Sisters			3
Mothers			6
Fathers			6

Relationship of 98 Partial Dependents.

Mothers	48	Sisters	13
Fathers	25	Brothers	8
Nieces	4		

The Remaining 220 of the 533 Industrial Fatal Injuries Show the Following Conditions of Dependency.

No dependents were left in	150 cases
Condition of dependency unknown in	48 cases
Incomplete returns as yet in	22 cases

FATAL INJURIES

691 FATAL INJURIES IN 1914
533 FATAL INJURIES IN 1915

COMPENSATION	$243,366 20	$203,286.47
MEDICAL AND BURIAL CHARGES	34,751 29	36,001 89
TOTAL	278,117 49	$239,288.36

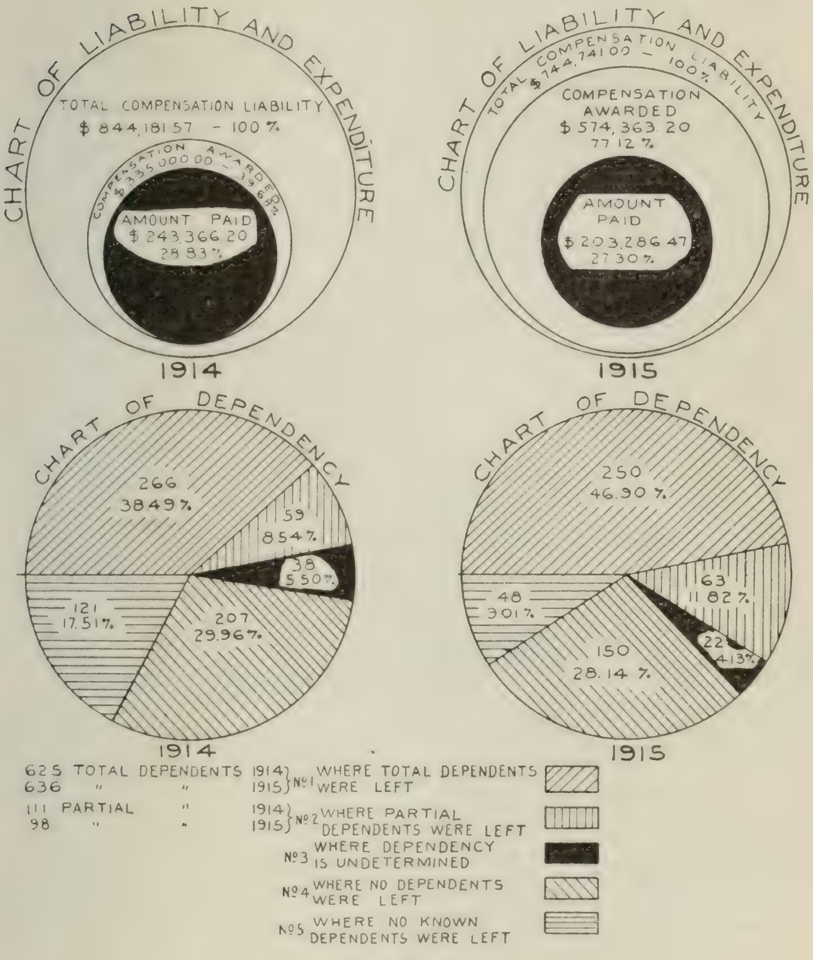


Chart No. 7.

Liability and Compensation Awards for Fatal Injuries.

The total liability created by the 533 fatal injuries in 1915 is smaller by about $100,000 than that for 1914, when it was $844,181.57. The amount of compensation payments recorded as of June 30, 1916, shows a little less paid at that date than for a similar period the year before. The difference is so slight that it might be accounted for by lump sum settlements. Seventy-seven per cent (77.12%), or $574,363.20 of the total compensation liability ($744,741) in the 533 fatal injury cases, was determined by awards before the Commission or on the Commission's advice.

Sex, Nativity and Marital Condition of Those Killed in 1915.

Two women workers were killed in 1915 and two in 1914. A little less than sixty per cent of those killed were Americans (57.22%), and fifty-one and twenty-two hundredths per cent (51.22%) of them were married. In reviewing chart No. 8, keep in mind that the size of the circle is determined on a 200 per cent basis, including both years experience for comparison, and that the top half of the circles represents 1915 experience and the bottom half, 1914.

This Table Correlates the Items of Sex, Nativity, Conjugal Condition and the Industry in Which the 533 Fatal Injuries Occurred.

Industry		Married			Single			Unknown			
		American	Foreign	Total	American	Foreign	Total	American	Foreign	Unknown	Total
Agriculture	Male	12	9	21	17	11	28	2	2	1	5
	Female	1	-----	1	-----	-----	-----	-----	-----	-----	----
	Totals	13	9	**22**	17	11	**28**	2	2	1	**5**
Construction	Male	18	17	35	17	20	37	2	3	1	6
Extraction	Male	20	16	36	18	14	32	1	2	-----	3
Manufacturing	Male	25	23	48	21	24	45	2	4	-----	6
Service	Male	11	4	15	6	3	9	1	-----	-----	1
Trades	Male	11	4	15	4	1	5	-----	-----	-----	----
Transportation	Male	72	23	95	30	32	62	3	11	-----	14
	Female	-----	-----	-----	1	-----	1	-----	-----	-----	----
	Totals	72	23	**95**	31	32	**63**	3	11	-----	**14**
Unknown	Male	4	3	7	5	-----	5	1	-----	-----	1
Totals (533)		174	99	**273**	119	105	**224**	12	22	2	**36**

533 INJURIES IN 1915 AND 691 INJURIES IN 1914 RESULTING FATALLY

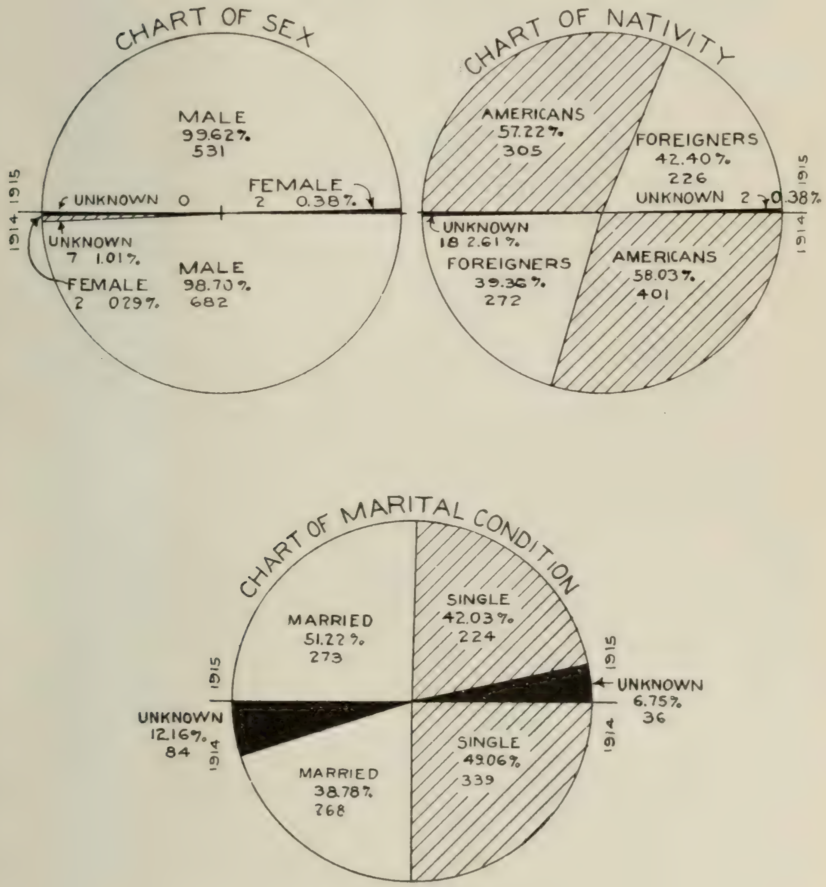


Chart No. 8.

AGE OF THOSE FATALLY INJURED IN 1915.

The Following Distribution is by Industries and Ten-year Age Groups.

Industry	Age groups								
	Un-known	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	Totals
Agriculture	3	2	14	14	7	10	5	-------	55
Construction	7	4	27	17	12	8	3	-------	78
Extraction	1	-------	18	33	13	5	1	-------	71
Manufacturing	3	5	27	26	20	9	7	2	99
Service	2	1	7	5	5	3	2	-------	25
Trades	-------	1	6	2	6	4	1	-------	20
Transportation	10	1	40	58	37	14	9	3	172
Unknown	1	-------	2	3	2	3	2	-------	13
Totals	27	14	141	158	102	56	30	5	533

The average age of those injured in 1915 was 38 years; in 1914 it was 39 years.

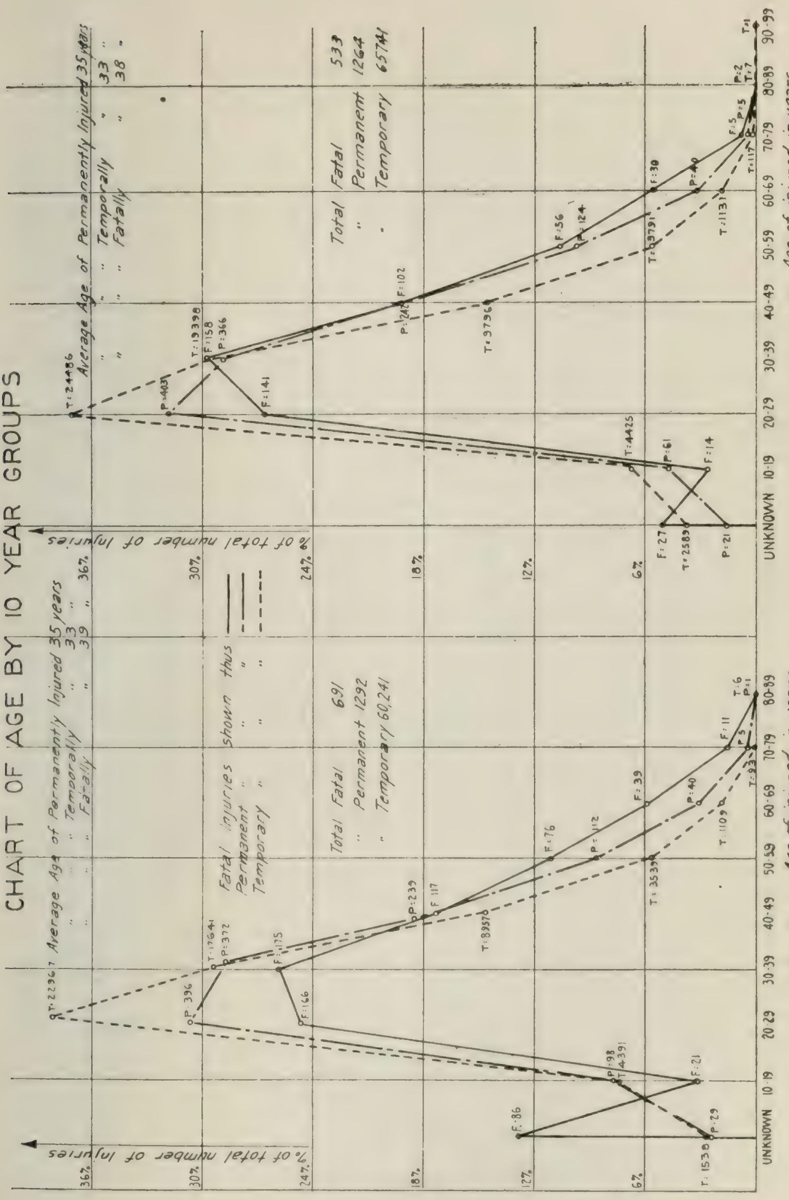


CHART OF AGE BY 10 YEAR GROUPS
Average Age of Permanently Injured 35 years
" " " Temporarily " 33 "
" " " Fatally " 39 "
Fatal injuries shown thus
Permanent " " "
Temporary " " "
Total Fatal 691
" Permanent 1292
" Temporary 60,241
% of total number of injuries
36% 30% 24% 18% 12% 6%
UNKNOWN 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89
Age of injured in years
1914
F:86 P:29 T:1538
F:21 P:98 T:4391
T:22367 P:396 F:166
T:17641 P:372 F:175
P:239 F:117 T:8957
F:76 P:112 T:3539
F:39 P:40 T:1109
F:11 P:5 T:93
T:6 P:1
Average Age of Permanently Injured 35 years
" " " Temporarily " 33 "
" " " Fatally " 38 "
Total Fatal 533
" Permanent 1264
" Temporary 65741
% of total number of injuries
36% 30% 24% 18% 12% 6%
UNKNOWN 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99
Age of injured in years
1915
F:27 T:2589 P:21
T:4425 P:61 F:14
T:24486 P:403 F:141
T:19398 F:158 P:366
F:102 P:242 T:9796
F:56 P:124 T:3791
F:30 P:40 T:1131
F:5 P:5 T:117
P:2 T:7
T:1

Chart No. 9.

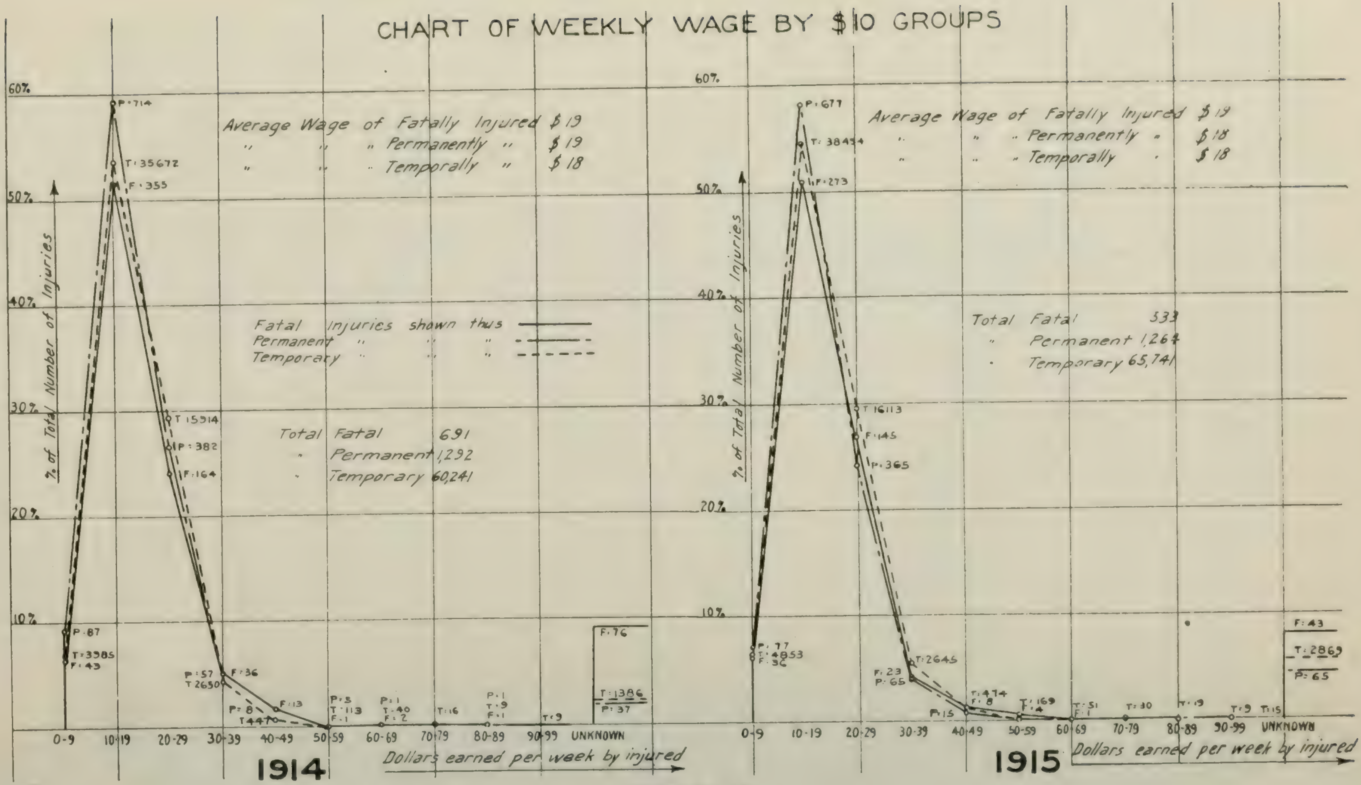


CHART OF WEEKLY WAGE BY $10 GROUPS
60%
50%
40%
30%
20%
10%
% of Total Number of Injuries
P·714
T·35672
F·355
Average Wage of Fatally Injured $19
" " " Permanently " $19
" " " Temporally " $18
Fatal Injuries shown thus
Permanent " " "
Temporary " " "
T 15514
P:382
F:164
Total Fatal 691
" Permanent 1,292
" Temporary 60,241
P·87
T·3985
F·43
P:57
T 2650
F·36
P: 8
T 447
F:13
P:5
T·113
F·1
P:1
T·40
F:2
T:16
P·1
T·9
F·1
T·9
F·76
T:1386
P:37
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
UNKNOWN
1914
Dollars earned per week by injured
P·677
T: 38454
F·273
Average Wage of Fatally Injured $19
" " " Permanently " $18
" " " Temporally " $18
Total Fatal 533
" Permanent 1,264
" Temporary 65,741
T 16113
F·145
P·365
P·77
T·4853
F·32
F·23
P·65
T·2645
P·15
T·474
F·8
T·169
F·4
T·51
F·1
T·30
T·19
T·9
T·15
F:43
T·2869
P·65
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
UNKNOWN
1915
Dollars earned per week by injured

Chart No. 10.

WAGE OF THOSE FATALLY INJURED IN 1915.

The Following Distribution is by Industries and Ten-dollar Wage Groups.

Industry	Wage groups									
	Contract	Unknown	$9	$10 to $19	$20 to $29	$30 to $39	$40 to $49	$50 to $59	$60 to $69	Totals
Agriculture	2	7	13	31	2	------	------	------	------	55
Construction	------	1	1	57	14	4	1	------	------	78
Extraction	1	4	------	26	35	2	2	------	1	71
Manufacturing	8	4	5	59	16	5	------	2	------	99
Service	2	1	3	9	7	1	1	1	------	25
Trades	1	------	2	10	6	1	------	------	------	20
Transportation	1	9	10	76	63	8	4	1	------	172
Unknown	------	2	2	5	2	2	------	------	------	13
Totals	15	28	36	273	145	23	8	4	1	533

The average wage for fatal injuries was $19.00 per week in 1915.

533 FATAL INJURIES.

Time: 12 months—January 1 to December 31, 1915.

Grouped by Main and Specific Causes.

52 Fatal Injuries Due to Machinery.

Parts of body or clothing caught in machinery, with protruding set screws, exposed gears, belts or shafts, 10. Crushed by falling or breaking derricks, 3. Fell into dredge machinery, 1. Caught and crushed in elevator shafts, doors. etc., 5. While walking in front of caterpillar engine to get warm, stumbled and was run over, 1. Fragments of wood kicked back by saws, planers, etc., 4. Struck by pulleys, or ends of chains or ropes, which broke while the machinery of which they were a part was in operation, 6. Falling from, or being caught between skip and shaft, 4. Struck by sling-load of lumber, 2. Caught in sweep of stump puller, 2. Caught and crushed by traveling cranes, 2. Struck by detached or broken parts thrown off by machinery in operation, 5. Crushed by sudden fall of boom, 1. Crushed by sack conveyor, 1. Struck by cables or chains which slipped off logs or other large objects while they were being hauled, 5.

90 Fatal Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Delayed blasts which exploded from contact with pick or steam shovel, 10. Premature explosion while blasting, 9. Slight injuries which resulted in blood poison or tetanus, 4. Struck by flying rock from blast, 1. Explosion of powder during process of manufacture, 3. Explosion of powder or dynamite due to careless handling, 2. Explosion of powder during the production of battle scene in moving picture play, 1. Asphyxiated by fumes from dynamite explosion in powder drift of a mine, 4. Overcome by acid fumes, 1. Overcome by gas in street main, 1. Overcome by fumes from wine vats, vaults, etc., 4. Overcome by smoke at fire, 1. Explosion of boilers, etc., 5. Explosion of illuminating gas underneath a dwelling where injured was repairing a leaking pipe, 1. Explosion through accidental ignition of gasoline and distillate, due principally to the careless handling of lanterns in the vicinity of open tanks or where the fluid had been spilled, 9. Scalded by steam escaping from bursted pipes, tanks, etc., 4. Surrounded while fighting brush fires, 2. Trapped in burning structures, 4. Fell into kettle of glue, 1. Tire rim blew off, striking in face and severing artery, 1. Linemen handling wires which came in contact with high-power wires, 5. Backed against unprotected switchboard, fuse boxes, etc., 3. Came in contact with high-power wire while working around pumps and fell into well pit, 2. Working on piling machine and hand touched live wire, shock caused injured to fall, 1. Doing odd jobs adjacent to switchboards or other electrical apparatus, came in contact with high-power wire, 8. Sunstroke while working in the fields, 3.

71 Fatal Injuries Due to Falling, Rolling and Flying Objects.

Caving of sewer trenches, embankments, etc., 11. Caught under falling wall, 1. Caught under falling sacks of cement, 2. Caught under bale of hay, 1. Caught under falling lumber, girders, etc., 5. Caught under falling tree, 13. Caught under logs which rolled or fell from loaded cars, 6. Struck by objects, such as bricks, pipes, scantling, etc., which fell from structures in course of construction, 5. Keg fell down shaft in mine, 1. Condenser bed fell on injured, 1. Water tank fell on injured, 1. Falling and flying rock, and sliding earth loosened by blasting from the face of banks or cliffs, 23. Struck by grindstone which flew to pieces, 1.

67 Fatal Injuries Due to Personal Falls.

Supposed to have walked into elevator shaft thinking elevator was there, as body was found at bottom of shaft, 3. Fell down shaft in mines by slipping on timbers, or through the breaking of same, 4. Fell from wagonload of hay, 4. Swept from top of box car by telephone wires, 1. Fell from bridge during course of construction, 4. Fell when flooring of porch gave way, 1. Fell from lifting apparatus such as cranes or derricks, 4. Fell from ladders, 4. Fell from seeder drill, 1. Fell into ship's hatch, 3. Lost balance or slipped and fell from scaffolds, platforms, etc., 10. Falls through the slipping or breaking of some part of scaffold, 4. Lost balance and fell from height by being struck by some moving or falling object, 7. Lost balance and fell from walls, buildings or other structures, 12. In the production of a moving picture play, actor jumped from stagecoach into river and struck rocks, 1. Fell from aeroplane in production of moving picture play, 1. Fell through skylight while hanging out clothes, 2. Slipped and fell from chair, lacerating leg, infection set in and death resulted, 1.

202 Fatal Injuries Due to General or All Other Causes.

Chain on casting slipped, and injured was crushed between two castings, 1. Run over by a disc harrow, 1. Thrown from seat when team ran away, 14. Handcars and velocipedes collided with trains, 6. Collisions between trains and wagons, 2. Driving motor vehicles which were struck by trains, 4. Struck by train or run over while crossing or working on track, 19. Jumped from engine of runaway train, 1. Knocked from side ladder on train and rolled under another car, 1. Alighted from engine and stepped in front of moving train, 1. Brakeman attacked and thrown from car by hoboes, 1. Boarding or alighting from train, 3. Fell from moving locomotive while riding on running board, 4. Fell or were jolted from moving cars, cabooses, or locomotives, 15. Fell from moving car, 1. Caught under rolling log or crushed between log and other object, 8. Struck on board ship by heavy sea sweeping over deck, 2. Shot by holdup men, 2. Shot while making arrests, 11. Gored by bulls, 2. Handling a Gila monster in sideshow, 1. Struck by lightning, 1. Struck by sling-load and thrown into hatch, 1. Fell from aloft to deck, 1. While riding bicycle, collided with automobile, 2. While riding motorcycle collided with automobile, cars or poles, 7. Explosion of gun during production of moving picture play, 1. Jammed in stall, or jumped on and kicked by horses or mules, 6. Thrown from wheel horse he was riding and run over, 1. Thrown by saddle horse, 2. Caught and buried in flow of rock from chute, 1. Derailment of engines or motor cars, 7. Caught between railroad rolling stock and platforms, 3. Collisions on railroads, 7. While on traveling train, struck by protruding objects such as posts, brace, etc., 3. Train operators crushed between cars, 4. Automobile collision, 3. Was struck and knocked down a shaft in a mine by a fellow workman who had fallen from height above, 1. While driving a wagon was struck by street car, 2. Fell or was jolted from seat of wagon through the sudden lurching of the team, driving into a chuck hole, or from some other cause unknown, 22. Automobile accidents, such as collisions, the breaking of steering gear, or the overturning of machines, 13. Struck by racer car speeding around track, 1. Overcome by gas and dust in kiln, 1. Hand bruised while sweeping, infection which permeated the entire system, 1. Strains from lifting or sudden wrenches which caused internal injuries, 11. Sunstroke while working on roof, 1. Pneumonia contracted from exposure, 2. Affected with mercurial poisoning, 1.

48 Fatalities Due to Drowning.

Fell from aeroplane into bay and was drowned, 1. Overtaken by a flood of soft mud during construction of tunnel, 2. Fell into sump of mine and was drowned, 1. Taking a line ashore, small boat capsized, 2. Left disabled vessel to go ashore in a small boat, was never heard of, 1. Drowned while fishing from a small boat, 4. Crossing a river in basket and cable, fell out, 1. Clearing debris from arch of bridge when rush of flood waters carried them down the river, 4. Drowned while crossing slough on horseback, 1. Jumped overboard from burning launch and were drowned, 3. Small boat swamped, man was drowned, 1. Drowned in wreck of vessel, 2. Fell from vessel or washed overboard in heavy sea, 23. Fell into hold of vessel and was drowned in bilge water, 1. Fell and was drowned in tank of oil, 1.

Dead bodies of workmen found, cause of death a matter of conjecture, 3.

Analysis of Compensation Awards, Payments and Medical Costs by Chief Causes and Industries Where Fatalities Occurred in 1915.

The following nine tables analyze and correlate the awards, payments of compensation, medical and burial benefits with the industries in which the injuries occurred and with the chief causes of the injury. The first two tables are a summary of the succeeding seven:

TABLE No. 1.

533 Fatal Injuries—Main Industry, Awards, Compensation and Medical Costs.

Industry	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Agriculture	55	$16,767 63	$8,588 02	$5,235 08	$13,823 10
Construction	78	83,057 99	23,248 95	5,416 23	28,665 18
Extraction	71	93,289 64	35,054 33	6,123 17	41,177 50
Manufacturing	99	102,174 97	26,454 07	6,625 91	33,079 98
Service	25	44,010 37	11,794 86	2,063 50	13,858 36
Trades	20	44,213 34	7,863 82	2,054 66	9,918 48
Transportation	172	190,849 26	90,282 42	8,174 34	98,456 76
Unknown	13	------------	------------	309 00	309 00
Totals	533	$574,363 20	$203,286 47	$36,001 89	$239,288 36

TABLE No. 2.

533 Fatal Injuries—Chief Causes, Awards, Compensation and Medical Costs.

Chief cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	52	$67,653 98	$22,660 70	$4,831 53	$27,492 23
Dangerous substances	90	108,801 52	40,801 31	6,769 65	47,570 96
Falling, rolling and flying objects	71	82,493 47	19,787 83	4,286 75	24,074 58
Personal falls	67	83,411 52	24,521 73	4,483 96	29,005 69
General or all other causes	202	196,178 97	86,957 49	13,494 25	100,451 74
Unknown	3	6,425 00	1,304 02	250 00	1,554 02
Drowning	48	29,398 74	7,253 39	1,885 75	9,139 14
Totals	533	$574,363 20	$203,286 47	$36,001 89	$239,288 36

The average award made in fatal cases was $2,353.94.
The average compensation paid in fatal cases was $899.49.
The average burial and medical costs in fatal cases were $131.75.

TABLE No. 3.

Analysis of 55 Fatal Injuries Occurring to Employees Engaged in Agriculture and Its Neighboring Pursuits, Chief Causes of the Injuries, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	5	$900 00	--------------	$468 50	$468 50
Dangerous substances	13	5,257 23	$2,782 23	1,488 10	4,270 33
Falling, rolling and flying objects	4	1,000 00	--------------	146 78	146 78
Personal falls	6	1,800 00	1,617 95	414 50	2,032 45
General or all other causes	26	7,810 40	4,187 84	2,592 20	6,780 04
Drowning	1	--------------	--------------	125 00	125 00
Totals	55	$16,767 63	$8,588 02	$5,235 08	$13,823 10

TABLE No. 4.

Analysis of 78 Fatal Injuries Occurring to Employees Engaged in All Forms of Construction Work, Chief Causes of the Injuries, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	6	$3,292 52	$907 79	$738 71	$1,646 50
Dangerous substances	9	9,906 25	2,167 65	690 10	2,857 75
Falling, rolling and flying objects	19	15,714 00	6,248 90	1,031 30	7,280 20
Personal falls	19	30,001 34	6,069 27	1,582 32	7,651 59
General or all other causes	17	19,768 88	5,730 34	842 80	6,573 14
Drowning	8	4,375 00	2,125 00	531 00	2,656 00
Totals	78	$83,057 99	$23,248 95	$5,416 23	$28,665 18

TABLE No. 5.

Analysis of 71 Fatal Injuries Occurring to Employees Engaged in the Mining of Minerals, Oil, Rock and Stone, Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	9	$10,215 50	$2,914 61	$1,695 97	$4,610 58
Dangerous substances	20	35,588 79	12,842 81	2,001 65	14,844 46
Falling, rolling and flying objects	18	23,346 00	6,006 40	1,342 00	7,348 40
Personal falls	11	13,762 73	10,546 59	411 75	10,958 34
General or all other causes	11	10,276 62	2,643 92	593 80	3,237 72
Drowning	2	100 00	100 00	78 00	178 00
Totals	71	$93,289 64	$35,054 33	$6,123 17	$41,177 50

TABLE No. 6.

Analysis of 99 Fatal Injuries Occurring to Employees Engaged in All Kinds of Manufacturing, Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	14	$17,802 80	$5,466 07	$1,065 60	$6,531 67
Dangerous substances	21	14,678 69	6,791 40	1,050 90	7,842 30
Falling, rolling and flying objects	13	15,810 00	2,507 33	766 00	3,273 33
Personal falls	8	9,337 40	2,503 02	746 15	3,249 17
General or all other causes	32	33,216 08	7,237 95	2,125 51	9,363 46
Drowning	9	4,905 00	644 28	671 75	1,316 03
Unknown	2	6,425 00	1,304 02	200 00	1,504 02
Totals	99	$102,174 97	$26,454 07	$6,625 91	$33,079 98

TABLE No. 7.

Analysis of 25 Fatal Injuries Occurring to Employees Engaged in Specialized Occupations or Businesses Where No Commodity is Manufactured or Produced, But Where Service is Sold, Skilled, Unskilled, Professional, Etc., i.e., Hotels, Office Buildings, Clubs, Resorts, Hospitals, Schools, Churches, Libraries, Amusement Places, Etc.,—Chief Causes, Award, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	3	$5,495 46	$609 80	$410 00	$1,019 80
Dangerous substances	3	6,943 86	1,085 35	363 90	1,449 25
Falling, rolling and flying objects	2	3,690 00	659 58	105 50	765 08
Personal falls	8	18,352 05	2,370 49	783 00	3,153 49
General or all other causes	8	9,529 00	7,069 64	351 10	7,420 74
Unknown	1	------------	------------	50 00	50 00
Totals	25	$44,010 37	$11,794 86	$2,063 50	$13,858 36

TABLE No. 8.

Analysis of 20 Fatal Injuries Occurring to Employees Engaged in the Mercantile Trades. No Manufacturing, No Construction, Only Light Forms of Transportation Where Own Teams are Operated. Chief Causes, Award, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	4	$9,576 00	$2,613 18	$339 00	$2,952 18
Dangerous substances	1			268 00	268 00
Falling, rolling and flying objects	1	2,618 00	292 88	179 00	471 88
Personal falls	5	10,158 00	1,414 41	237 00	1,651 41
General or all other causes	8	16,861 34	3,543 35	1,031 66	4,575 01
Drowning	1	5,000 00			
Totals	20	$44,213 34	$7,863 82	$2,054 66	$9,918 48

TABLE No. 9.

Analysis of 172 Fatal Injuries Occurring to Employees Engaged in All Forms of Transportation Service Such As Steam and Electric Railroads, Ocean and River Steamers, Ferry and Bay Boats, Stage and Auto Bus Lines, Etc. Included in This Total Are Fatal Injuries Occurring to Employees Engaged in Public Utilities,—Water and Lighting Plants, etc.,—Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Burial and medical	Total compensation, burial and medical
Machinery	10	$20,371 70	$10,149 25	$113 75	$10,263 00
Dangerous substances	23	36,426 70	15,131 87	907 00	16,038 87
Falling, rolling and flying objects	12	20,315 47	4,072 74	616 17	4,688 91
Personal falls	7			309 24	309 24
General or all other causes	94	98,716 65	56,544 45	5,748 18	62,292 63
Drowning	26	15,018 74	4,384 11	480 00	4,864 11
Totals	172	$190,849 26	$90,282 42	$8,174 34	$98,456 76

NOTE.—Thirteen fatal injury reports did not bear sufficient data at time of this report to classify the industry in which they occurred. Eight of these cases totaled payments of $309 for burial expenses.

A Study of 1,264 Permanent Injuries Occurring in 1915. Wage Loss and Liability.

The 1,264 injuries under consideration here involve an approximated wage loss or impairment of the earning capacity running well over four million dollars ($4,123,800). The liability, itself, which in all likelihood will be assumed by employers and insurance companies is estimated to be $824,760, and if this amount should be paid and each of the 1,264 men who were hurt should receive an average share, this would be about $652.50.

Injuries in 1914 and 1915 Compared.

There were 28 more permanent injuries in 1914 than in 1915. Although there seems to be a slight lessening in the severity of the injury judging from the average percentage of impairment for both years, yet the 146 permanent injuries which were not rated in time for this report may be so severe in nature as to raise this average considerably for 1915. The one factor that lends strength to this position is that in 1914 the number of pension cases was 31 while in 1915 only 13 have been rated as pension cases at this time of writing.

The following figures compare the permanent injury experience for 1914, 1915 and the first six months of 1916. It is pretty safe to say that we are getting fairly accurate returns on the serious injury cases and that the normal for any year is approximately established.

Industry	1914	1915	First six months, 1916
Agriculture	92	123	41
Construction	193	172	65
Mining, oil and quarrying	184	158	64
Manufacturing	450	452	184
Service (laundries, hotels, etc.)	41	68	23
Mercantile trades	78	99	36
Transportation (railroads and waterways), also public utilities	245	192	91
Unknown and unclassified	9	----------	31
Totals	1,292	1,264	535

It will be seen from chart No. 11 that each five per cent group (with two exceptions) of injuries has some injuries under it for both years, 1914 and 1915, and that the lengths of the lines in each group are so nearly even that the rating of the 146 undetermined injuries will probably affect each group. The two exceptions are groups of injuries rated from 80 per cent to 90 per cent impairment. There were no injuries in 1915 which received this rating. It will be noted also that only six cases of 100 per cent or permanent total disability occurred in 1915 as against 13 such cases for the same period of time in 1914. It is early to say, but we do not look nor hope for any permanent total disability cases to appear in the unrated cases which yet remain to the credit of 1915.

The largest group of permanent injuries as seen from chart No. 11 is composed of injuries which were rated from twenty-five hundredths of one per cent to five per cent. This class of injuries comprises 19.3 per cent of all the permanent injuries in 1915. In pursuing the scheme of comparison on chart No. 11, read the solid line for 1915 and the hatched line for 1914.

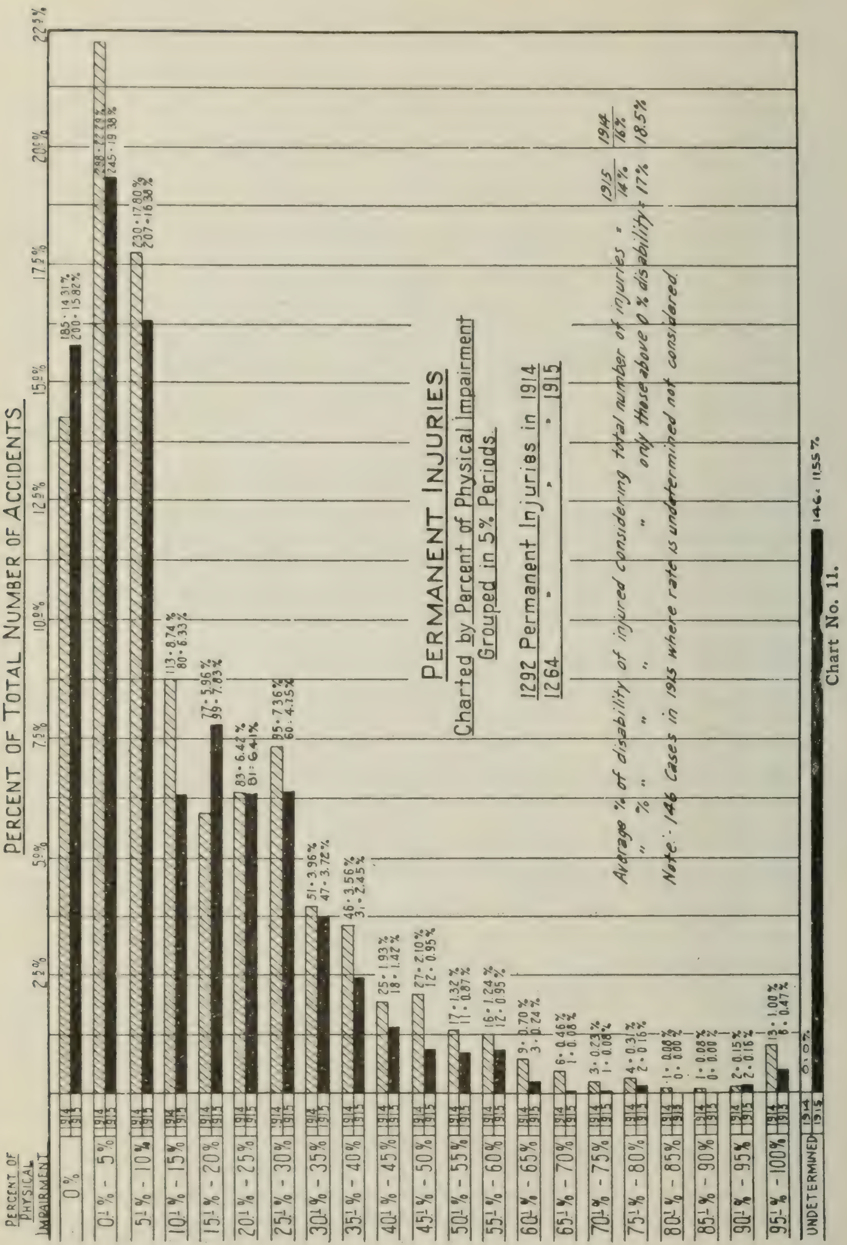

PERCENT OF TOTAL NUMBER OF ACCIDENTS
2.5%
5.0%
7.5%
10.0%
12.5%
15.0%
17.5%
20.0%
22.5%
PERCENT OF PHYSICAL IMPAIRMENT
0%
0.1% - 5%
5.1% - 10%
10.1% - 15%
15.1% - 20%
20.1% - 25%
25.1% - 30%
30.1% - 35%
35.1% - 40%
40.1% - 45%
45.1% - 50%
50.1% - 55%
55.1% - 60%
60.1% - 65%
65.1% - 70%
70.1% - 75%
75.1% - 80%
80.1% - 85%
85.1% - 90%
90.1% - 95%
95.1% - 100%
UNDETERMINED
1914
1915
185 · 14.31%
200 · 15.82%
288 · 22.29%
245 · 19.38%
230 · 17.80%
207 · 16.38%
113 · 8.74%
80 · 6.33%
77 · 5.96%
99 · 7.83%
83 · 6.42%
81 · 6.41%
95 · 7.36%
60 · 4.75%
51 · 3.96%
47 · 3.72%
46 · 3.56%
31 · 2.45%
25 · 1.93%
18 · 1.42%
27 · 2.10%
12 · 0.95%
17 · 1.32%
11 · 0.87%
16 · 1.24%
12 · 0.95%
9 · 0.70%
3 · 0.24%
6 · 0.46%
1 · 0.08%
3 · 0.23%
1 · 0.08%
4 · 0.31%
2 · 0.16%
1 · 0.08%
0 · 0.00%
1 · 0.08%
0 · 0.00%
2 · 0.15%
2 · 0.16%
13 · 1.00%
6 · 0.47%
0 · 0%
146 · 11.55%
PERMANENT INJURIES
Charted by Percent of Physical Impairment
Grouped in 5% Periods.
1292 Permanent Injuries in 1914
1264 " " " 1915
1915 1914
Average % of disability of injured considering total number of injuries = 14% 16%
" % " " " only those above 0 % disability = 17% 18.5%
Note: 146 Cases in 1915 where rate is undetermined not considered

Chart No. 11.

TABLE No. 10.

1,264 Permanent Injuries. Distribution in 5 Per Cent Groups of Physical Impairment and the Industries in Which the Injuries Occurred.

Percentage of physical impairment	Industries							
	Agriculture	Construction	Extraction	Manufacturing	Service	Trades	Transportation	Totals
Unknown	26	26	14	32	12	11	25	146
0%	14	21	29	71	11	19	35	200
1- 5%	33	26	33	99	11	15	28	245
6- 10%	14	22	19	90	12	23	27	207
11- 15%	6	14	10	28	4	5	13	80
16- 20%	8	16	13	36	6	5	15	99
21- 25%	12	10	12	27	1	10	9	81
26- 30%	3	8	11	24	1	3	10	60
31- 35%	3	9	7	12	6	4	6	47
36- 40%	1	4	2	13	1	1	9	31
41- 45%	--------	4	--------	9	2	1	2	18
46- 50%	1	2	--------	3	--------	1	5	12
51- 55%	2	3	3	--------	--------	1	2	11
56- 60%	--------	2	--------	7	--------	--------	3	12
61- 65%	--------	1	--------	--------	1	--------	1	3
66- 70%	--------	1	--------	--------	--------	--------	--------	1
71- 75%	--------	--------	--------	1	--------	--------	--------	1
76- 80%	--------	--------	2	--------	--------	--------	--------	2
91- 95%	--------	1	1	--------	--------	--------	--------	2
96-100%	--------	2	2	--------	--------	--------	2	6
Totals	123	172	158	452	68	99	192	1,264

The foregoing table is an extension of the analysis begun in chart No. 11, and carries the distribution into the industries responsible for the permanent injuries. It is interesting to note that only three industries are responsible for the most serious injuries. Construction has three injuries to its credit ranging from 91 per cent to 100 per cent impairment. Mining of minerals and oil has five injuries ranging from 76 per cent to 80 per cent impairment. Transportation has two injuries rated at 96 per cent to 100 per cent impairment.

Age of Those Permanently Injured in 1915.

The average age of those receiving permanent injuries was 36 years. Sixty-one permanent injuries occurred to employees under 19 years of age, and some of this number were not over 10 years old. Of this number 25 occurred to employees engaged in manufacturing establishments.

TABLE No. 11.

The Following Distribution Is by Industries and Ten-year Age Groups.

Industry	Age groups									
	Unknown	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	Totals
Agriculture	6	5	29	32	27	16	7		1	123
Construction	3	4	43	54	38	23	6	1		172
Extraction	1	5	61	49	31	9	2			158
Manufacturing	3	25	164	129	80	38	11	2		452
Service	3	6	10	29	13	4	3			68
Trades	4	15	25	23	16	12	3	1		99
Transportation	1	1	71	50	37	22	8	1	1	192
Totals	21	61	403	366	242	124	40	5	2	1,264

Wage of Those Permanently Injured in 1915.

The average wage of those permanently injured in 1915 was nineteen dollars ($19) per week. There were only four cases where wages were on a contract scale rather than by day or week.

TABLE No. 12.

The Following Table Shows a Distribution of Wages in Ten-dollar Groups by the Industries in Which the Injuries Occurred.

Industry	Wage groups							
	Contract	Unknown	$9	$10 to $19	$20 to $29	$30 to $39	$40 to $49	Totals
Agriculture	3	20	16	62	18	3	1	123
Construction		6	1	88	59	13	5	172
Extraction		5	2	80	57	10	4	158
Manufacturing	1	11	26	256	135	20	3	452
Service		4	7	32	13	12		68
Trades	1	7	12	55	21	2	1	99
Transportation		8	13	104	62	5		192
Totals	5	61	77	677	365	65	14	1,264

SEX, NATIVITY AND MARITAL CONDITION OF THOSE PERMANENTLY INJURED IN 1915.

Sex.

Twenty-four women and girls were permanently injured in 1915 against nineteen in 1914. Some of the severe hand injuries shown in the pictures which follow are women and girl workers' hands. They most frequently receive these injuries while engaged in laundering clothes with machines either improperly designed or protected.

Nativity.

Sixty-four and four-tenths per cent (64.4%) of those permanently injured were Americans. About the same proportion existed in 1914.

Marital Condition

The married men did not seem to get off any lighter than the single men.—the assumption that they are more cautious to the contrary notwithstanding.

The circles on chart No. 12, which follows, are drawn to include both years' experience and therefore represent 200 per cent. The top half of the circles include 1915 experience and the bottom half, 1914.

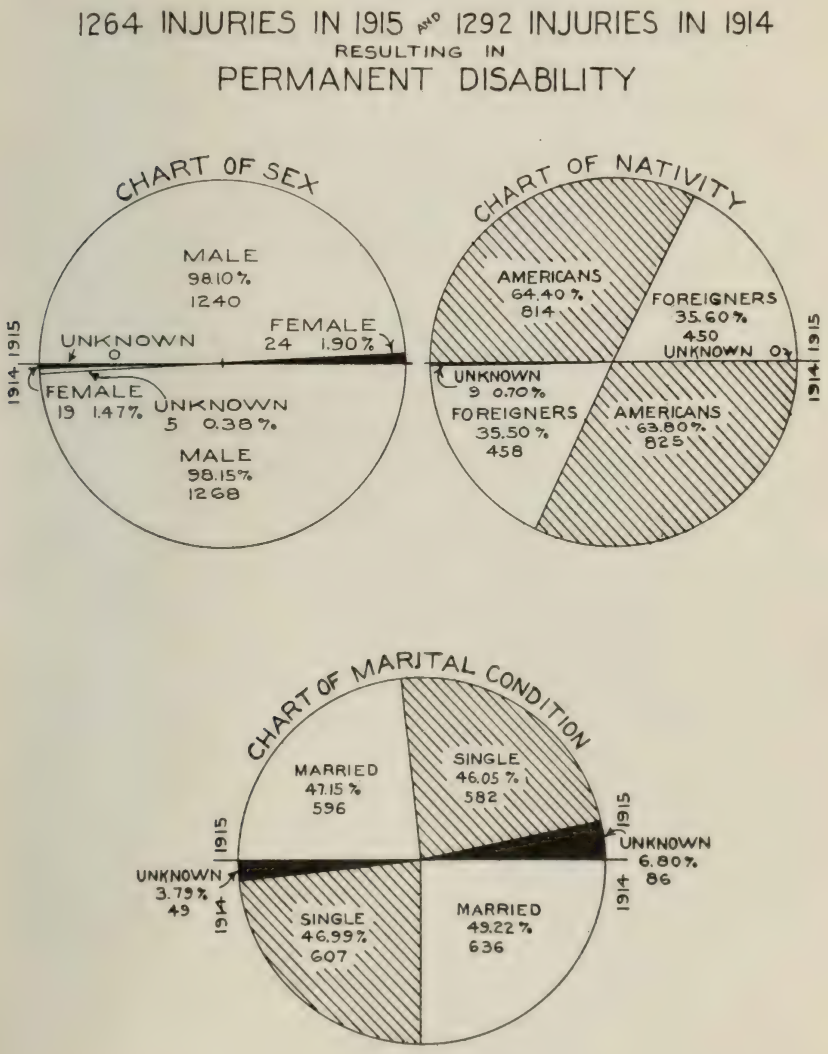


Chart No. 12.

In the following table, No. 13, the items of nativity, marital condition, sex and industry are correlated with subtotals for each industry group of married, American males, females, etc. The only industries in which women were not permanently injured while employed were construction, mining and transportation. The other industries are not free from this charge, and "service" has the highest number, 12, to its credit:

TABLE No. 13.

This Table Correlates the Items of Sex, Nativity, Conjugal Condition, and the Industry in Which the 1,264 Permanent Injuries Occurred.

Industry		Married			Single			Unknown		
		American	Foreign	Total	American	Foreign	Total	American	Foreign	Total
Agriculture	Male	33	7	40	42	26	68	5	9	14
	Female	1	-----	1	-----	-----	-----	-----	-----	----
	Totals	34	7	41	42	26	68	5	9	14
Construction	Male	52	33	85	41	25	66	16	5	21
Extraction	Male	35	27	62	47	40	87	4	5	9
Manufacturing	Male	150	72	222	121	82	203	13	7	20
	Female	3	2	5	2	-----	2	-----	-----	----
	Totals	153	74	227	123	82	205	13	7	20
Service	Male	22	6	28	16	8	24	4	-----	4
	Female	5	1	6	6	-----	6	-----	-----	----
	Totals	27	7	34	22	8	30	4	-----	4
Trades	Male	27	10	37	33	15	48	6	4	10
	Female	1	1	2	1	1	2	-----	-----	----
	Totals	28	11	39	34	16	50	6	4	10
Transportation	Male	73	35	108	49	27	76	6	2	8
Totals (1,264)		402	194	**596**	358	224	**582**	54	32	**86**

The following chart, No. 13, is a graphic representation of the number of permanent injuries resulting from general causes in each industry. The unit determining the size of the square is the number of injuries occurring in both the years 1914 and 1915, due to machinery used in manufacturing. The two parallelograms should equal this square unit and the surface of each parallelogram is blocked out in proportion to the number of injuries occurring under any chief cause and any given industry. The top parallelogram in each block is for 1914 experience and the lower half is for 1915. It is interesting to note the regularity of the conditions causing injuries in both years:

CHART OF 1264 PERMANENT INJURIES IN 1915 AND 1292 IN 1914 BY CAUSE AND INDUSTRY

		AGRICULTURE	CONSTRUCTION	QUARRYING, MINING OF MINERALS & OILS	MANUFACTURING	SERVICE	TRADES	TRANSPORTATION	UNKNOWN	TOTALS
MACHINERY	1914	36	62	63	288	21	46	63	5	584
	1915	57	53	54	270	21	45	48	0	548
DANGEROUS SUBSTANCES	14	11	18	18	30	7	4	22	2	112
	15	9	12	20	34	10	11	20	0	116
FALLING OBJECTS	14	14	47	59	57	3	10	61	0	251
	15	16	41	47	78	14	15	57	0	268
TOOLS	14	6	10	4	30	1	7	11	0	69
	15	6	17	7	24	0	10	13	0	77
ANIMALS	14	13	6	0	2	0	2	5	0	28
	15	21	6	0	2	3	1	0	0	33
COLLISIONS	14	2	18	26	25	1	2	47	1	122
	15	4	13	19	19	5	4	36	0	100
PERSONAL FALLS	14	4	30	13	14	8	4	34	1	108
	15	5	24	7	15	13	11	16	0	91
MISC. & ALL OTHERS	14	3	2	0	2	0	1	2	0	10
	15	5	3	0	5	0	0	2	0	15
UNKNOWN	14	3	0	1	2	0	2	0	0	8
	15	0	3	4	5	2	2	0	0	16
TOTALS	1914	92	191	184	450	41	78	245	9	1292
	1915	123	172	158	452	68	99	192	0	1264

Chart No. 13.

DETAILED STUDY OF THE CAUSES OF 1,264 PERMANENT INJURIES OCCURRING IN 1915.

548 Permanent Injuries Due to Machinery.

The 548 permanent injuries resulting from machine accidents are attributable to the following causes: Hands which in some instances were gloved, caught in plungers, reamers and chucks of pneumatic drills, etc., 6. Injuries common to back-fires of gas and oil motors, 4. Members of body caught in unprotected belts, clutches, pulleys, etc., 13. (In five cases of these 13 accidents members of body were drawn into belts due to loose clothing catching on same.) Injuries due to members of body being caught in unprotected chains, sprockets, etc., on concrete mixers, rock crushers and machines of such character which have sections driven by loose mesh chains and sprockets, 16. Members of body caught in drills, dies, punches, metal stamps and presses which were being operated at time of injury, 21. The following are 15 elevator and hoisting apparatus injuries: (Caught hand between cable and drum as elevator started, 5; injured's fingers crushed between "runner guide" and "runner wheel," 2; while riding in elevator, cable parted, cage fell, resulting in injury to occupant, 1; injured's arm caught between elevator and cross-brace, 1; foot caught between elevator and shaft, 2; misunderstanding in signal caused platform elevator to rise too soon, resulting in injury to occupant, 2; defective elevators, same operating when unexpected, resulting in injuries to occupant, 2.) While working with propellers or fan blades, motor driven, sustained injuries to hands, fingers or arms, 5. While grinding, hand came in contact with emery wheel, 1. Injuries common to mangle irons, feed rolls and machines of this character which are oftentimes poorly protected, 15. While wiping and oiling same, hands caught in moving crossheads of gas engines and internal combustion motors, etc., 15. Members of body mashed or crushed in unprotected or improperly protected gears, 60. (In many instances the injured members of body were drawn into the gears, due to loose clothing worn by attendant.) The following is a fairly close analysis of 67 accidents common to hoisting apparatus, such as derricks, cranes, etc.: (Injuries due to hands being drawn into sheaves or between cables, lines, etc., and roller or drum upon which same is wound; sometimes injury occurred when workman unconsciously placed his hand upon moving cable or rope in the attempt to steady himself, 41; injuries due to entanglement with the line operating a power driven hay fork, 9; hand caught in grab bucket, 2; injured party while steadying himself unconsciously laid hand upon crane rail, 2; snubbing post broke, permitting loop of rope to entangle man, 1; hoisting drum insecurely anchored, blown over by wind, injuring workman, 1; hands or fingers caught between hoisting line and load which was being hoisted, 5; hoisting chain or cable broke, allowing load to fall on workman, 3; struck by material handled by crane, 2; foot became entangled with hoisting line which was attached to cargo, 1.) Injuries common to jointers, edging machines, slicers, stayers, planers, etc., while in motion and which are not protected sufficiently to prevent fingers and hands from entering moving parts of same, 56. Hands of pile-driver man caught between hammer and pile, 2. Coming in contact with saws in motion, both band and circular, which are either unprotected entirely or which have improper guards or guards which do not prevent injured from coming in contact with the saw itself or material flying back from the machine, 86. Sleeves caught on set screws, 2. Thumb caught on set screws, 2. Caught in shafting or conveyors which were in motion and which were being worked upon, 7. Coming in contact with knives and grinders used in preparing food, such as meat grinders, ice crushers, sausage machines, bone crushers, etc., 43. Injuries similar to the classification above but where the slicing machines are used for thin metals or shearing machines for heavier material, paper, etc., 8. Struck or caught in moving parts of steam engines while attending same; injuries in this class are similar to those listed under hoisting apparatus or internal combustion motors (see above), 14. The following injuries were reported as resulting from machines which seem to be common to most all of the industries, but the information was not sufficient to determine the specific character of the machine and they have, therefore, been grouped by the industries in which the report was made: Various agricultural machinery, type not specified, 9; machinery used in the manufacturing of brick, both clay and concrete, 3; unspecified type of machinery used in construction work, 6. Various types of machinery used in the manufacturing and preparation of foodstuffs; judging from the nature of the injury, the machinery is very likely similar to machines which are used for topping and sealing cans, slicing up meats, bread, etc., 16. Various machinery used in the manufacturing of leather and rubber products, type not specified, 4. Various machinery used in the lumbering industry, type not specified, 5. Unspecified type of machinery used in machine shops, foundries, etc., 4. Mining machinery, type not specified, 4. Printing presses and machinery used in the manufacturing of cartons, etc., and other various types of machinery peculiar to the printing and manufacturing of paper, 16. Various types of machinery, information as to character of industry or type of machine used not given on report, 9. Lathes, 5. Injuries occurring while using ordinary jacks, levers and pinch bars which have no mechanical power, 9.

116 Permanent Injuries Due to Dangerous Substances.

Came in contact with live wires which resulted in severe burns and sometimes in fractures, due to injured being thrown from elevation, due to shock from contact with wire, 4. Injuries incident to the use of powder and dynamite, 23. A more specific statement of these causes is interesting: One man, a farm hand, holding a high explosive with a very short fuse in his hand, lighted it, same exploding in his hands; premature explosions occurring while tamping holes, 5; simple premature explosions, other conditions not specified, 5; miner dug into unexploded powder hole, 3; miner being afraid some exploders would ignite from light on his hat, placed them in what he considered a place of safety, only to pass by exploders later and ignite them with the light on his own hat, doing what he rather expected some one else would do, 1; feeding rock into crusher and fed in rock with powder in it, resulting in the crusher emitting small pieces of rock which peppered his face, 1; drilled into old hole which had not exploded, 1; returning to see why shot didn't fire, shot fired on arrival, 2; was testing out fuse, didn't notice that same had a cap on the end of it, same exploded, 1; injured stuck candlestick into a cap which had blown out of hole without exploding, cap was covered up in the muck and injured party did not see same, 1; drilled into missed shot hole, 2.) Escaping gas ignited by pilot light, 1. Clerk was filling gasoline tank on truck, lantern hanging over tank, fumes ignited, 1. Gasoline exploded in dry cleaning establishment, 1. Flareback in firebox of small oil-burning boiler, 1. Moving picture actress fell from box near fire pots, injuring eyes, 1. Turpentine bandage on hand ignited, 1. Infection of burns from teakettle, 2. Splashing of hot metals from moulds, 2. Car washer burned from steam out of hose line, 1. Particles of cement in eyes, 2. Swinging door upset pitcher of sulphuric acid, 1. Burns from use of limewater, 3. Burns from solution of lime, 2. Meter man inhaled carbon monoxide gas, 1. Wounds from slivers of glass, wood or metal; injuries resulting from these causes are not very large at first, but being in the nature of puncture wounds very frequently, if not most frequently, result in infection; this class also includes nail wounds, 62. Premature explosion of cannon used in play resulting in powder burns, 1. Burns from contact with hot substances used in laundries, resulting in infection, 1. Explosion of aluminum dust injuring structure of ear, 1. Exposed to elements nine days while fishing, 1. Explosion of concentrated nitrous ether, 1. Explosion of bottles containing liquids under pressure, 2.

181 Permanent Injuries Due to Falling, Rolling and Flying Objects.

Injuries in this class are the result of falling, rolling and flying objects which either fall of their own weight or which are propelled by some external force. Injuries due to rocks falling from roofs or sides of tunnels, also cave-ins of walls in tunnels or deep trenches while working in same, 16. Injuries received while handling heavy rock, 11. Scaffolds collapsing and falling upon injured, 2. Material piled high fell over, 3. Flying pieces of glass, steel slivers and all hard substances such as emery, bone, rock, wood, etc., which result in puncture wounds, deep lacerations and bruises of almost all parts of the body, 97. Injured workmen, while engaged about building or premises, struck by miscellaneous objects which were insecurely anchored, such as posts, planks, casings, barrels, boxes, tools, etc., which were lying around loosely upon elevations of buildings, shelves, etc., 52.

91 Permanent Injuries Due to Personal Falls.

The following accidents are due to the falling of injured workman himself, sometimes due to being overbalanced by the burden which he is sustaining, sometimes due to stumbling or tripping over material lying loosely in his pathway, sometimes due to unguarded openings which lie in his path or due to poorly constructed scaffoldings or railings which are for his protection while his mind is centered upon his duties. Injuries resulting from falls from ladders which are poorly anchored or which have poor braces, 15. Falls while ascending stairs with burdens which make his tread uncertain, 2. Falls from scaffolds due to being overbalanced or making misstep; scaffold did not collapse; evidently the protection was not sufficient, 20. Fell into elevator shaft while trying to lay timber across same, 1. Fell from roof of building which did not have any balustrade to prevent injured from falling, 10. Fell into open hatch hole, 4. Falls due to tripping over fixed objects or due to entanglement of both feet in objects which were not fixed; sometimes injured was handicapped with a burden, sometimes not, 17. Stepping into unguarded openings, mostly ground level openings, 9. Fell from telephone pole, 1. Fell from wharf, 1. Fell backwards out of wagon, 1. Fell while handling hay with hay hooks which were insecurely inserted, 2. Slipped on wet incline, 2. Lever slipped in hands of pile-driver tender and he fell from derrick, 1. Miscellaneous falls, 5.

312 Permanent Injuries Due to General or All Other Causes.

The following causes of injuries are classified in a general way and include altercations, animal accidents, intoxication cases, accidents incidental to the transportation industry, etc. Assaults upon individuals, 2. Injuries incidental to the care and handling of animals, such as being bitten, stepped upon, kicked, etc., 16. Accidents incidental to the driving of animals while frightened or attempting to run away, 20. Gunshot wounds, either intentional or unintentional, 6. A large number of injuries which are classed under the head of "General Causes," covers practically all injuries incidental to the use and handling of tools, either sharp or blunt, which, in the hands of the operator himself or a fellow-servant, are either mismanaged or defective, 78. Injuries received while injured was intoxicated, 2. Injuries sustained in collisions with motorcycles or automobiles or due to skidding of motorcycle or automobile, 21. Injuries received while engaged in handling railroad cars; coupling of cars, climbing freight cars, stepping from one car to another or being knocked down by cars or run over or struck by same, 32. Injuries resulting from striking fixed objects with head or parts of body; evidently these protruding objects which are fixed are unexpected or else the workman has become so accustomed to them that they make no demands upon his attention, 8. Injuries received while handling heavy or medium-sized objects or while moving heavy objects around ships, 112. Injuries received from handling objects which are hinged or which fall back or out of place, 15.

Injuries where the specific cause is as yet undetermined, 16.

A Study of the Costs by the Chief Causes of the 1,264 Permanent Injuries in 1915.

The following classification is of the general headings for "Cause" which were discussed in detail above.

The 548 machine injuries were awarded $212,810, of which $117,325.38 has been paid in compensation to the injured workmen together with an additional sum of $33,785.62 (not included in award), which has been paid to physicians for the cure and relief of the injured, or a grand total of $151,111 as of June 30, 1916.

The 116 injuries due to inherently dangerous substances, etc., were awarded $92,142 in compensation. Of this, $47,164.69 has been paid. The medical costs were $15,147.14. Total losses for the 116 injuries as of June 30, 1916, $62,311.83.

In Tabular Order, By Awards.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	548	$212,810 00	$117,325 38	$33,785 62	$151,111 00
General or all other causes	312	129,396 00	85,404 15	25,717 63	111,121 78
Falling, rolling and flying objects	181	121,103 00	64,073 74	17,329 39	81,403 13
Dangerous substances	116	92,142 00	47,164 69	15,147 14	62,311 83
Personal falls	91	52,636 00	27,756 30	14,047 06	41,803 36
Unknown causes	16	4,293 00	3,013 83	458 83	3,472 66
Totals	1,264	$612,380 00	$344,738 09	$106,485 67	$451,223 76

Average Award, Compensation Payments and Medical Costs in 1,264 Permanent Injury Cases, 1915.

If each of the 1,264 permanently injured workmen should get an average share of the total award made in these cases the amount would be $484.47. Considering only cases in which awards were made, this average would be $683.46. Remember, the average for fatal cases in which awards were made was $2,353.94 (see fatal tables).

The average compensation paid in these cases, considering the total 1,264 cases, was $272.73. The average compensation paid in cases of permanent injuries where only cases are considered in which payments were made was $374.31.

The average medical payments considering all 1,264 cases of permanent injury was $84.25 and considering only such cases of this number where medical payments were made the average was $115.60 per case.

TABLE No. 14.

1,264 Permanent Injuries, Main Industry, Awards, Compensation and Medical Costs.

Industry	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Agriculture	123	$41,413 00	$30,752 27	$13,136 66	$43,888 93
Construction	172	116,162 00	59,816 50	21,420 92	81,237 42
Extraction	158	89,769 00	37,249 83	13,333 93	50,583 76
Manufacturing	452	196,650 00	109,072 70	30,466 95	139,539 65
Service	68	18,122 00	13,014 52	7,644 24	20,658 76
Trades	99	40,873 00	21,729 89	8,686 07	30,415 96
Transportation	192	109,391 00	73,102 38	11,796 90	84,899 28
Totals	1,264	$612,380 00	$344,738 09	$106,485 67	$451,223 76

TABLE No. 15.

Analysis of 123 Permanent Injuries Occurring to Employees Engaged in Agricultural Pursuits. Chief Causes of Injuries, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	57	$18,463 00	$13,506 39	$4,155 66	$17,662 05
Dangerous substances	9	2,956 00	2,133 64	727 50	2,861 14
Falling, rolling and flying objects	10	6,207 00	4,871 98	1,644 99	6,516 97
Personal falls	5	950 00	1,007 50	726 43	1,733 93
General or all other causes	42	12,837 00	9,232 76	5,882 08	15,114 84
Totals	123	$41,413 00	$30,752 27	$13,136 66	$43,888 93

TABLE No. 16.

Analysis of 172 Permanent Injuries Occurring in Construction. Chief Causes of the Injuries, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	53	$30,890 00	$14,944 03	$6,288 80	$21,232 83
Dangerous substances	12	16,536 00	4,317 68	2,452 15	6,769 83
Falling, rolling and flying objects	31	22,047 00	14,954 93	3,590 35	18,545 28
Personal falls	24	22,349 00	12,041 64	5,095 44	17,137 08
General or all other causes	49	22,576 00	11,794 52	3,959 03	15,753 55
Unknown causes	3	1,764 00	1,763 70	35 15	1,798 85
Totals	172	$116,162 00	$59,816 50	$21,420 92	$81,237 42

TABLE No. 17.

Analysis of 158 Permanent Injuries Occurring to Employees Engaged in the Mining of Minerals, Oil, Rock and Stone. Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	54	$25,746 00	$9,445 12	$3,697 65	$13,142 77
Dangerous substances	20	26,131 00	7,041 56	1,812 75	8,854 31
Falling, rolling and flying objects	40	26,722 00	10,649 65	3,378 89	14,028 54
Personal falls	7	1,847 00	2,090 07	1,756 36	3,846 43
General or all other causes	33	8,105 00	7,621 81	2,377 65	9,999 46
Unknown	4	1,218 00	401 62	310 63	712 25
Totals	158	$89,769 00	$37,249 83	$13,333 93	$50,583 76

TABLE No. 18.

Analysis of 452 Permanent Injuries Occurring to Employees Engaged in All Kinds of Manufacturing. Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	270	$101,718 00	$61,309 07	$13,215 65	$74,524 72
Dangerous substances	34	13,489 00	8,652 49	2,498 48	11,150 97
Falling, rolling and flying objects	49	40,816 00	19,711 05	5,785 61	25,496 66
Personal falls	15	10,875 00	3,253 92	2,123 48	5,377 40
General or all other causes	79	28,903 00	15,650 11	6,788 93	22,439 04
Unknown	5	849 00	496 06	54 80	550 86
Totals	452	$196,650 00	$109,072 70	$30,466 95	$139,539 65

TABLE No. 19.

Analysis of 68 Permanent Injuries Occurring to Employees Engaged in Specialized Occupations or Businesses Where No Commodity Is Manufactured or Produced, But Where a Service Is Sold, Skilled, Unskilled, Professional, etc., i. e., Hotels, Office Buildings, Clubs, Resorts, Hospitals, Schools, Churches, Libraries, Amusement Places, etc. Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	21	$3,402 00	$2,668 62	$1,510 73	$4,179 35
Dangerous substances	10	4,745 00	3,406 67	1,951 66	5,358 33
Falling, rolling and flying objects	8	2,726 00	885 52	699 50	1,585 02
Personal falls	13	4,292 00	3,938 90	2,116 60	6,055 50
General or all other causes	14	2,957 00	2,114 81	1,365 75	3,480 56
Unknown causes	2	------------	------------	------------	------------
Totals	68	$18,122 00	$13,014 52	$7,644 24	$20,658 76

TABLE No. 20.

Analysis of 99 Permanent Injuries Occurring to Employees Engaged in the Mercantile Trades. No Manufacturing, No Construction, Only Light Forms of Transportation Where Own Teams Are Operated. Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	45	$15,043 00	$7,190 11	$3,237 18	$10,427 29
Dangerous substances	11	4,593 00	1,410 56	1,341 59	2,752 15
Falling, rolling and flying objects	13	7,598 00	5,424 03	1,391 15	6,815 18
Personal falls	11	4,290 00	2,987 19	1,350 85	4,338 04
General or all other causes	17	8,887 00	4,365 55	1,307 05	5,672 60
Unknown	2	462 00	352 45	58 25	410 70
Totals	99	$40,873 00	$21,729 89	$8,686 07	$30,415 96

TABLE No. 21.

Analysis of 192 Permanent Injuries Occurring to Employees Engaged in All Forms of Transportation Service, Such as Steam and Electric Railroads, Ocean and River Steamers, Ferry and Bay Boats, Stage and Auto Bus Lines, Etc. Included in This Total Are Permanent Injuries Occurring to Employees Engaged in Public Utilities—Water and Lighting Plants, Etc. Chief Causes, Awards, Compensation and Medical Costs.

Cause	Number of cases	Award	Compensation	Medical benefits	Total compensation and medical benefits
Machinery	48	$17,548 00	$8,262 04	$1,679 95	$9,941 99
Dangerous substances	20	23,691 00	20,202 09	4,363 01	24,565 10
Falling, rolling and flying objects	30	14,987 00	7,576 58	838 90	8,415 48
Personal falls	16	8,033 00	2,437 08	877 90	3,314 98
General or all other causes	78	45,131 00	34,624 59	4,037 14	38,661 73
Totals	192	$109,391 00	$73,102 38	$11,796 90	$84,899 28

Circumstances of 60 Permanently Injured Employees 12 to 24 Months After Injury.

The Statistical Department has been investigating as many of the permanent injuries as possible every twelve and twenty-four months after the injury occurred in order to determine, if possible, how many of the injured recoup themselves entirely, maintain their same level or fall below it. The results have not been entirely satisfactory owing to the difficulty of keeping in touch with the injured employees and in many cases to their inaccessibility.

However, the Commission succeeded in getting photographs of several hundred permanent injuries and fairly accurate histories of the cases in two hundred or more cases. The following conditions were found to be true of 205 investigated cases. Nearly four per cent (3.9%) of the permanently injured workmen were receiving a higher wage than they did before their injury. About thirty per cent (29.8%) of them were getting the same pay, twelve months later, that they were when injured. Nineteen per cent (19.02%) suffered a reduction (amount of reduction not yet determined) of wages. Thirteen per cent (13.17%) had no work, for several reasons, and twenty per cent were still unable to work. About eight per cent (7.8%) of them had settled their claims in lump sums and had gone into some light business for themselves and seemed to be succeeding at the task of mixing their brains and money for a fairly good profit. Six per cent of the cases were not sufficiently determined to include in the above classes.

A Special Study of the 60 Pictures of Permanent Injuries in This Report.

The following was found to be true of the 60 permanently injured employees whose pictures are contained in this report:

	Per cent
(1) Those receiving higher wages than before injury	6.67
(2) Those receiving the same wages 12 months later as at time of injury	35.00
(3) Those receiving lower wages than at time of injury	11.66
(4) Those who had no work although seemed able to work	15.00
(5) Those who were unable to work on account of injury	13.33
(6) Those who had lump sum settlements and had entered business for themselves	11.66
(7) Conditions not satisfactorily ascertained	6.66

HISTORY OF 60 PERMANENT INJURIES.

The following records or histories refer to the pictures of permanent injuries published herewith. The first two pages were designed to afford a study of the type of finger and hand injuries, and the third page or group of injuries affords a study of the injuries to the workmen's eyes. The fourth page is made up of selected pictures to give the reader some idea of the manner in which the feet and limbs of the workmen are affected by accident.

The injuries to the hands, feet and legs are all clearly shown, but the eye injuries in some cases are not very distinct in detail. Some of the injuries to the eye are simply impaired vision, while others have glass eyes which were not removed when the injury was photographed, and these, therefore, will not appear as serious as those where the injured's eye was removed and there was no replacement of a glass one.

History No. 1.

This man is in the middle years of life, is a skilled mechanic, on a wage of $3.50 per day. While performing his duties his hand was caught in a machine, causing the loss of the third and fourth fingers. Time lost due to accident, four weeks. His injury was given a disability rating of 12 per cent and settled in lump sum at $475, which he applied on paying for his home. He has a wife but no children. He is still employed by the company in whose service he was injured and at the same wage, but thinks he would find it hard to get work among strangers.

History No. 2.

The subject of this sketch is a skilled workman, 40 years of age, has a wife and three children to care for. The accident caused the loss of portions of the first, second and third fingers of his right hand, as shown in the picture. Though the accident was quite serious, he lost only two weeks, and is still employed by the same firm at the same wages. He was given a disability rating of 26 per cent, and his compensation is $13.22 per week for a period of 104 weeks.

History No. 3.

The subject is only 15 years of age. At the time of the accident which resulted in a limited motion of the middle and ring fingers of his right hand, he was employed as a butcher's helper. The boy was right-handed and unfortunately does not make serious efforts to become skillful with his left hand. However, he is still in the employ of the butcher in whose service he was injured, and at a wage of $7 per week. He was getting only $6 at the time of the accident. He was given a rating of 15½ per cent or 62 weeks at $13.12 per week. Compensation was based on his probable wage at 21 years.

History No. 4.

The subject is 47 years of age, a skilled mechanic. His accident took away portions of the second, third and little fingers of his left hand. He lost only six weeks due to the injury. He was given a rating of 17 per cent, or 68 weeks. He has no family, owns his home, and since the accident he has become a member of the firm in whose service the accident occurred. He thinks in case he should ever desire to get work with others he would be very much handicapped.

History No. 5.

This man is 52 years of age, has a wife and two minor children. He owns his home, but it carries a heavy mortgage. The accident which caused the loss of the thumb and first finger of his right hand has resulted in the loss of one year's time and the reduction of his wages from $5 to $3 per day. Though he is a skilled mechanic, he finds it difficult to obtain and to hold a job. He was given a rating of 41¾ per cent or 167 weeks at $18.75 per week.

History No. 6.

This young man is 22 years old, has no family but feels partly responsible for the maintenance of two sisters, one only 17 years old and the other a widow with two small children. The injury was caused by unguarded laundry machinery and consists in the loss of all the fingers of his right hand except one, and this finger is stiffened and crooked. He is at present earning $12 per week but can not hope to be advanced very much in wages. His rating was placed at 26 per cent or 104 weeks.

History No. 7.

The subject described herein is a machinist 35 years old. The accident which took away portions of the index and middle fingers of the major hand, caused also the loss of seven weeks time. He is now earning the same wages as at the time of the accident, but feels that he can not compete successfully in the wage market. His rating was fixed at 14¼ per cent or 57 compensation weeks, at $13.12 per week, and settled in lump sum at $658. This he invested in the purchase of a small home.

History No. 8.

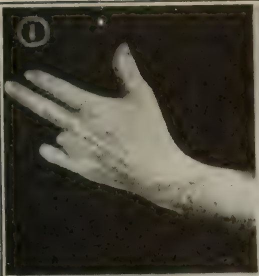
This man is a laborer, 50 years old, has a wife but no children. He owns his home, but it carries a heavy mortgage. His injury consists in the loss of the third and fourth fingers of his minor hand. He estimates his loss of time due to the accident at 12 months. His rating was fixed at 12½ per cent, or 50 weeks, and his compensation was $13.12 per week, amounting in all to $656. He finds it hard to get work and is at present ranching for himself.

History No. 9.

The subject of this sketch is 35 years old, no family. His injury consists in the removal of the second, third and fourth fingers of the right hand, and the entire immobility of the first finger and thumb of the same hand. His disability rating was fixed at 33½ per cent, or 134 weeks, and his compensation was paid in lump sum at $2,000. He is employed at a present wage of $25 per week as a teamster. The loss of time due to the accident was about four weeks. He thinks his chances for work are far more difficult.

History No. 10.

The subject is 28 years old, has no family but lives with his mother and is in part responsible for her maintenance. His injury consists in the loss of the middle finger of the major hand at the distal joint. His loss of time due directly to the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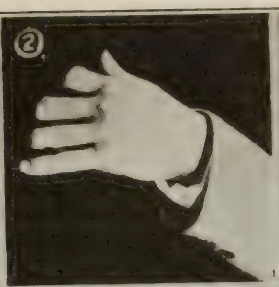
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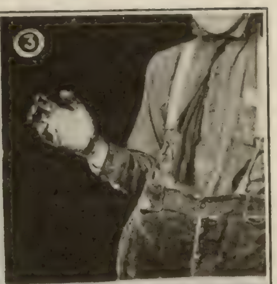
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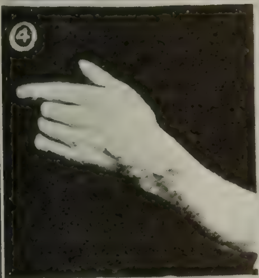
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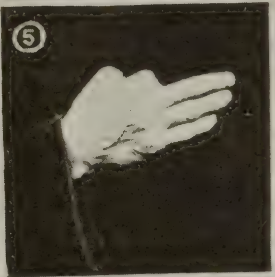
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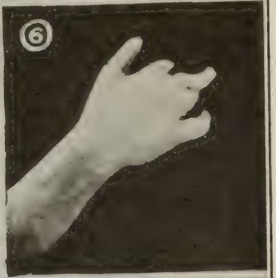
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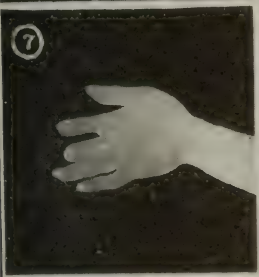
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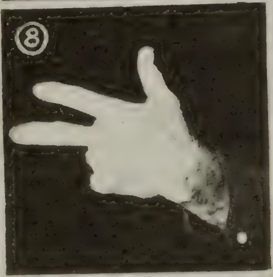
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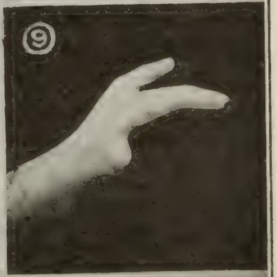
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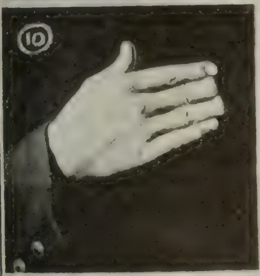
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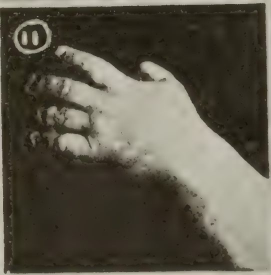
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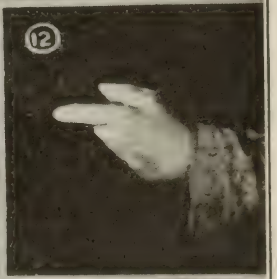
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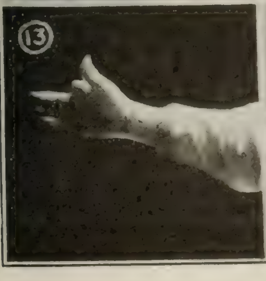
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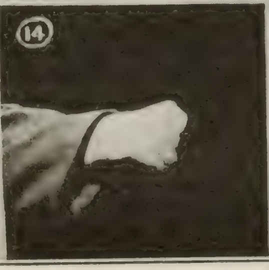
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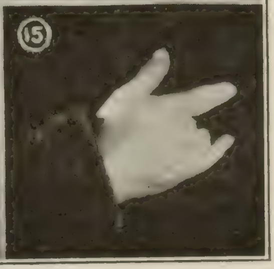
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accident was 36 days and his rating was placed at 4¼ per cent, or 17 weeks. The full amount of the compensation was promptly paid. He feels that work is more difficult to obtain.

History No. 11.

This man is 38 years old, has a wife and three minor children. His injury consists in the loss of a part of his minor thumb, a part of the minor ring finger, and the immobility of his minor index finger. He lost only 35 days on account of the accident. He is still in the service of the firm where he was injured, at the same wages. His rating is 15 per cent, or 60 weeks, and his compensation $13.12 per week.

History No. 12.

This man is a skilled mechanic, 56 years old, has a wife but no children. At the time of the accident he was receiving $24 per week. The accident resulted in the loss of his minor middle, ring and little fingers, and the stiffening of the index finger and thumb of the same hand. He is now unable to follow his trade of automobile building. He now works only a small part of the time at small wages. His loss of time due directly to the accident was 4½ months. His rating was placed at 39 per cent, or 156 weeks; compensation $15 per week.

History No. 13.

The subject is a carriage builder, 62 years old at the time he was injured, and is still on a wage of $4 per day with the same firm. The injury consists in the loss of the index finger of the major hand at the proximal joint. His injury resulted in the loss of about 75 days time. His rating is 14 per cent, or 56 weeks. He thinks he is not greatly disadvantaged.

History No. 14.

This man is a skilled mechanic, 32 years old, has a wife but no children. He is still in the service of the same concern as when injured, though at much less wages, his weekly earnings now being only $10.50. His injury resulted in the loss of his major hand. His disability rating was 44¼ per cent, or 177 compensation weeks at $9.37 per week. Although greatly handicapped for life, he is paying for a home and doing fairly well.

History No. 15.

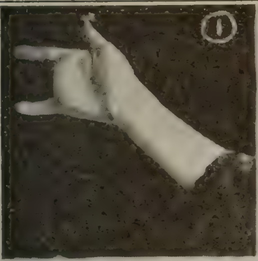
This man, a laborer, is 47 years old, has no family. His injury consists in the loss of the middle and ring fingers of his major hand, also the immobility of the index and little fingers of the same hand. He finds it harder to get work than before. His rating was fixed at 21 per cent, or 84 weeks, and paid in lump sum at $787.88. His loss of time due to injury he says was one year.

History No. 16. (1)

The subject is a boy 17 years old and was serving as a printer's apprentice when his hand was caught in a press, causing the loss of the second and ring fingers of his right hand. His injury was rated at 23 per cent, or 92 compensation weeks. and although he is still employed in the same place he feels he will be handicapped in reaching the top of his profession, and that he will need to fit himself to do work of a lighter nature than that on the form, or any work which requires the use and skill of all the fingers of his hand. The subject has not suffered any reduction in his wages, nor found difficulty in obtaining work, at least up to the present time. The total temporary disability due to this injury was about 70 days.

History No. 17. (2)

The subject is a young lady, just 20 years old at the time of the accident. The injury consists in the loss of the index and middle fingers, and half of the ring finger of the major hand, the fingers being caught in a machine equipped with knives. She is employed by the same firm at the same wages, $9 weekly. She lost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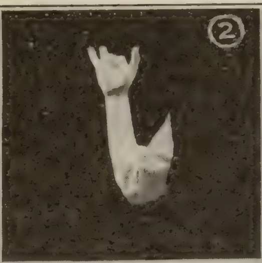
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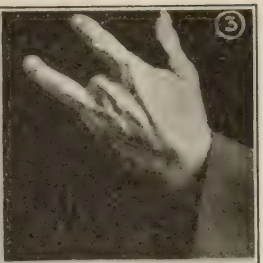
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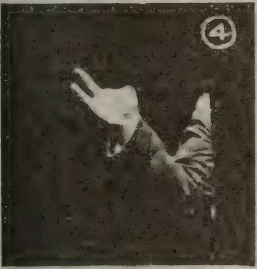
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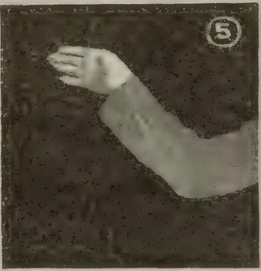
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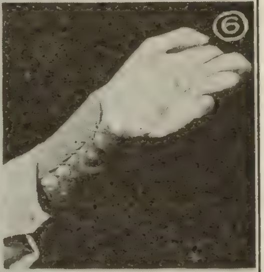
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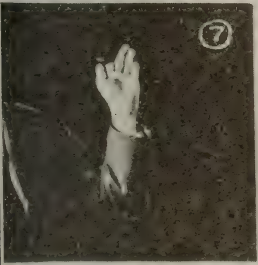
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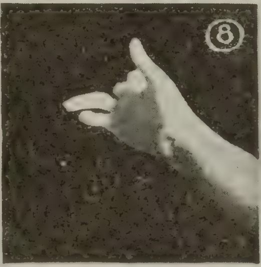
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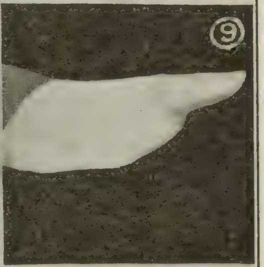
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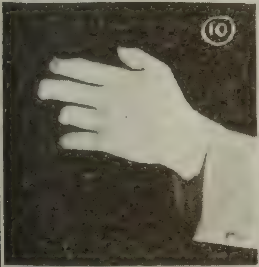
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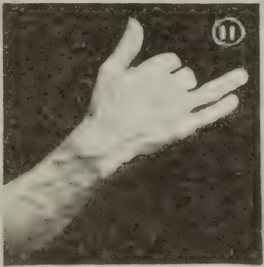
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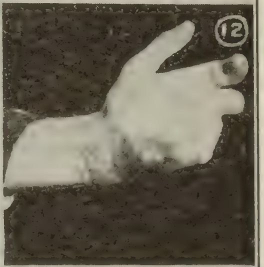
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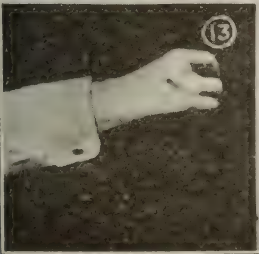
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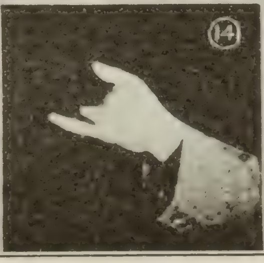
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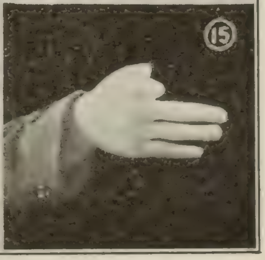
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six months time, due to the accident, and is prevented by it from promotion to better positions. Her compensation of $5.62 per week she is able to save for future use. Her rating was 27 per cent, or 108 weeks.

History No. 18. (3)

This man, a mill hand in a lumber mill, lost most of the middle and little fingers of his left hand in a jointer. He was 57 years old at the time, and had had five years experience in such work. For this injury he was given a rating of 10½ per cent, or 42 weeks at $8.44 per week.

History No. 19. (4)

This man is a laborer, with a wife and one child to care for. The accident caused the loss of the thumb, index and middle fingers of his major hand. He has not had any work since the injury, and depends upon his compensation of $9.37 per week for 134 weeks, and his wife's help, for maintenance. He was promised employment at the place where he was injured, but for some reason they have not given him a job yet. His rating is 33½ per cent.

History No. 20. (5)

This subject is a carpenter and was receiving $4 per day when the accident occurred. He is now working as ship caulker at $5 per day, but can not get steady work. His injury consists in the loss of the thumb of his major hand. His rating is 21¾ per cent or 87 compensation weeks at $15 per week. His loss of time due to the accident was four months. He has a wife and three minor children to support.

History No. 21. (6)

This man is 33 years old, has no family, was professional chauffeur at the time of the accident. The result of the accident is the practical loss of his minor hand. However, with the use of an iron hook which he has devised for himself, he is able to do some ranch work, for which he receives board and room. His rating was 40 per cent or 160 compensation weeks at $10.20 per week.

History No. 22. (7)

The subject of this sketch, 71 years old, is a carpenter by trade. He has no family dependent upon him. His home is with his married daughter. His injury consists in the loss of the index and restricted use of the middle finger of the minor hand. He has not been able to work since the accident took place. His rating was 20¼ per cent, or 81 compensation weeks, at $13.12 per week.

History No. 23. (8)

This man, 41 years old, sustained the loss of the index and middle fingers, major hand, at the second and proximal joints; also the stiffening of the ring and little fingers. His rating was fixed at 40 per cent, or 160 weeks, at $14.06 per week. He is at present working for the same people as before, at the same wages, although not making full time. His loss of time due to the accident was three months. His injuries have not fully healed, and he thinks he is very much handicapped for the future.

History No. 24. (9)

This 16-year-old high school student was working as assistant on a ditching machine for a dredging company at the time of the accident. His hand was caught in bevel gears, and as a consequence he lost all of his left hand excepting the thumb. A rating of 27½ per cent permanent disability was given him, carrying with it 110 weeks compensation at $9.34 per week.

History No. 25. (10)

This man is 49 years old, and has no family. His injury consists in the loss of the ring and little fingers at the middle joints, and the loss of smaller portions of the index and middle fingers, all on the minor hand. He was a skilled mechanic, but is now disabled for such work, and is running a small restaurant. His loss of time was three months. His rating was 25 per cent or 100 compensation weeks.

History No. 26. (11)

This subject, 29 years old, has a wife but no children. His injury consists in the loss of the index and middle fingers of his major hand just below the second joint, which he thinks greatly hinders his advancement in work. His rating is 18¼ per cent, or 73 weeks, and his compensation $11.25 per week, a part of which he is able to lay aside for future protection.

History No. 27. (12)

This man, 31 years old and married, was general foreman of a company erecting steel oil tanks. While he was explaining a gas engine's mechanism, his glove caught in the gears. The accident resulted in the loss of parts of his little and ring and middle fingers, and in limited motion of his wrist, thumb and index finger. He was given a rating of 38 per cent or 152 weeks at $20.83 per week.

History No. 28. (13)

This man is 54 years old, a barber by trade. The accident which resulted in the loss of the middle finger and the limited motion of all the fingers of his major hand, has also made it impossible for him longer to follow his occupation of barber. He is at present running a cigar stand. His compensation was fixed at $9.68 per week for 148 weeks. His rating is 37 per cent.

History No. 29. (14)

This young man, 22 years old, has no family, but lives with his father and mother. His injury consists in the loss of his minor middle and ring fingers, and caused him the loss of three months time and he is still unable to work. His disability rating was placed at 24¼ per cent or 97 compensation weeks at $9.37 per week. He thinks he is greatly handicapped for work.

History No. 30. (15)

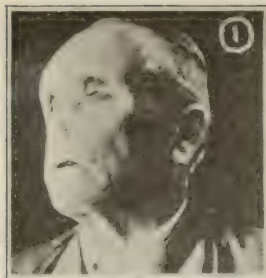
This subject is a young man, 23 years old, has no family to care for, and makes his home with his married sister. At the time of the accident he was a printing press apprentice, with ambition to become an expert pressman. But the accident, resulting in the loss of half the thumb and two-thirds of the index finger of his major hand, has taken away this ambition. His rating is 21¼ per cent or 85 weeks, at $7.50 per week. A lump sum was secured, and he has invested it in business.

History No. 31. (1)

The subject of this sketch, 62 years old, has no family. His injury consists in the total loss of both eyes and fearful disfigurement of his face. Otherwise he is in perfect health. His disability rating was fixed at 100 per cent, with a life pension of 40 per cent. His compensation was $10.32 per week. Since the failure of the insurance company he has been an object of charity.

History No. 32. (2)

This man, 32 years old, has a wife and one minor child to provide for. His injury consists in the complete loss of one eye. He says the accident caused him the loss of 50 days time. He was a successful automobile salesman, but the accident threw him out of employment and he has not yet been able to get back to his profession. His rating was 32¼ per cent or 129 compensation weeks at $15.63 per week.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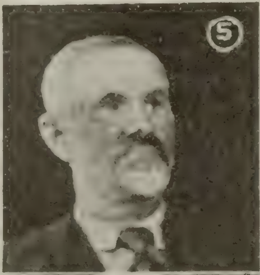
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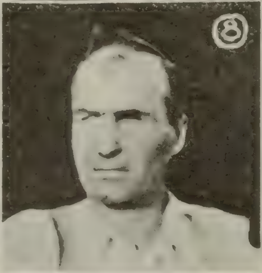
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History No. 33. (3)

This young man, 21 years old, has a wife but no children to care for. He is by occupation a dry cleaner. The accident which resulted in the partial loss of the vision of his right eye, and slight disfigurement of his face, caused him the loss of about six months time. He is now earning $15 per week. His disability rating was 8¼ per cent or 33 compensation weeks at $8.75 per week.

History No. 34. (4)

The subject, 28 years old, has no one dependent on him for support. The accident resulted in the total loss of the vision of one eye, though he lost no time from his work on account of it. His rating is 23¼ per cent or 93 compensation weeks at $13.68 per week. His present wages are $75 per month. He thinks his work is much more difficult to obtain since his injury occurred.

History No. 35. (5)

This man, 62 years old, has no family to care for. He was an expert powder man. He followed his occupation a long time and does not know how to do anything else, he says. His injury consists in the complete loss of his left eye. He says he can not see well enough to follow his occupation since the injury took place. His rating is 38¾ per cent, or 155 weeks, and his compensation $14.42 per week.

History No. 36. (6)

The subject, 45 years old, has a wife and two children to provide for. He is a skilled mechanic and is now earning $3 per day. His injury consists in the complete loss of his right eye. On this account he finds work more difficult to obtain. His rating was 33¼ per cent or 133 weeks, and his compensation $11.25 per week. He has been able to invest most of his compensation in the home he is paying for.

History No. 37. (7)

This subject, 33 years old, has a wife and two children to provide for, and is a painter by trade. His injury consists in the complete loss of his right eye. His total loss of time due to the accident was seven months. His disability rating was 33¼ per cent or 133 weeks at $13.12 per week. He feels that his earning power is greatly reduced on account of his injury.

History No. 38. (8)

This man, 35 years old, has a wife and three children to care for. His injury is the complete loss of vision in his left eye. He estimates the loss of time due to it at about eight months. He is now earning $18 per week, but finds it harder to get work. His rating was 32½ per cent or 130 weeks at $11.25 per week.

History No. 39. (9)

This subject, 31 years old, has a wife and one child to care for. His injury consists in the complete loss of the sight of his right eye. He is now running an automobile stage. He says his loss of time due directly to the accident was 92 days. His rating was fixed at 26 per cent or 104 weeks, and his compensation at $15 per week.

History No. 40. (10)

This man has a wife and two children to provide for. He is a skilled mechanic and is earning a wage of $4.50 per day, but thinks his chances for work are distinctly less than before the accident. His disability rating was fixed at only 5 per cent, or 20 weeks, and compensation at $15.86 per week. His injury is the complete loss of his right eye. He estimates the loss of time due to it at nine weeks.

NOTE.—The small rating given in this case was for the removal of the eye, which had been seriously injured previously, resulting in the loss of vision.

History No. 41. (11)

The subject herein described is a young man 27 years of age. He has a wife and one child to provide for. He was a skilled mechanic at the time of the accident, which resulted in the complete loss of vision in his left eye. He estimates his loss of time due to the injury at five months. His rating is fixed at 24¾ per cent or 99 weeks, and compensation at $16 per week.

History No. 42. (12)

This young man, 24 years old, has no family but helps care for his mother. His injury consists in the complete loss of his right eye. He estimates that he has lost about eight months time on account of it. He now finds it very much more difficult to obtain and hold a job than before the accident took place. His rating is 27.3 per cent or 111 weeks, and his compensation $9.37 per week. This was settled in a lump sum for $1,040, which has been invested.

History No. 43. (13)

This man has a wife and three children. He is a skilled mechanic and is still following his occupation. The work is not as steady as before the accident. His injury consists in the complete loss of his right eye. He was awarded a rating of 32½ per cent for 130 weeks, compensation at $11.25 per week.

History No. 44. (14)

The subject of this sketch, 25 years old, has a wife and one child to provide for. He is learning the auto repair business, and has a wage of $3.15 per day. His injury consists in the partial loss of the vision of one eye. He was awarded a disability rating of 16¼ per cent or 65 compensation weeks. The loss of time occasioned by the accident was 66 days.

History No. 45. (15)

This young man, now 28 years old, has no family to provide for, and is employed by the same firm in whose service he was injured. He is now earning a wage of $2.50 per day. His injury consists in the complete loss of his right eye, and the partial loss of the vision of his left eye. He was awarded a compensation of 240 weeks, and a life pension of $3 per week, based on an 80 per cent disability.

History No. 46. (1)

This man, 51 years of age, was a pumping-plant operator at the time of the accident, which resulted in the loss of his left arm just below the elbow. At the present time he is earning $2 per day, though he has no regular, steady position. His loss of time due directly to the accident was 78 days. He was awarded a disability rating of 48¼ per cent or 193 compensation weeks.

History No. 47. (2)

This man, 34 years of age, has a wife, one child and a mother to care for. His injury is very serious, consisting in the loss of his right leg just below the knee and loss of about one-third of the left foot. The company for whom he was working at the time of his injury still has him in its employ at a monthly wage of $71.50. He was given a rating of 67 per cent or 268 weeks, but his employer paid him a lump sum of $7,600. Most of this amount he says he has invested quite satisfactorily. Injured was employed as a brakeman at time of injury; while switching cars he was run over.

History No. 48. (3)

This subject is 50 years old and has a family to provide for. His injury consists in the loss of his right leg below the knee. Injury was sustained when his auto became stalled on a railroad track and in attempting to get it off he was hit by an approaching train. He was awarded a rating of 43 per cent or 172 compensation weeks. His loss of time due to the injury was nearly four months. He has

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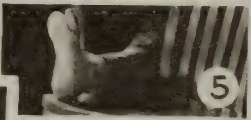
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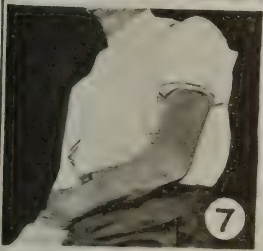
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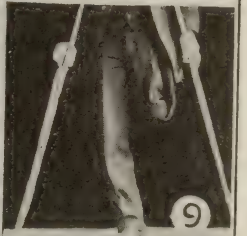
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returned to the position he held when he sustained the injury and at the same salary. He is a probation officer and as long as he can hold this position the question of a loss in earning power need not be raised.

History No. 49. (4)

This case covers a young man, 22 years of age, unmarried and not responsible for the maintenance of any one except himself. While employed as a separator man, sleeve caught in chains, drawing his hand in, causing the loss of left hand at wrist. In spite of this great handicap he is now earning $75 per month and board. He lost 66 days on acount of the accident. His rating is 35½ per cent or 142 weeks at $15.05 per week. He is still employed by the firm in whose service he was injured.

History No. 50. (5)

This man, 56 years of age, has no family or any one to care for except himself. His injury consists of the loss of portions of the first three toes of the left foot. He is now earning $75 per month, but thinks he is at a great disadvantage on account of his injury. He lost 14 months due to the injury. His rating was fixed at 26 per cent or 104 weeks with compensation at $9.37 per week. Injury was sustained while cutting wood for camp; ax slipped and cut left foot.

History No. 51. (6)

This subject, 53 years of age, has himself and wife to provide for. While operating a machine his arm was caught in the belting with the result that nearly all the nerves in the upper right arm and shoulder were severed and crushed. As the function of his arm is almost entirely destroyed he has been unable to do any regular work since the accident. His physician hopes he will eventually regain a partial use of his arm. He has been given a rating of 63 per cent or 252 weeks at $11.25 per week.

History No. 52. (7)

This man, 36 years of age, helps provide for his father and mother. He was a boilermaker by occupation but has not worked since the accident, June 6, 1915, partly because he is still unable to do the same kind of work, and partly because he feared return to any kind of work would compromise his compensation. His injury consists in the loss of the use and strength of his right wrist and hand. His injury was sustained when he fell about 30 feet when staging broke. There is also a limited motion of left elbow and impairment of grasping power of left hand. All of these functions are slowly improving. He was in the hospital more than three months. He was awarded a rating of 60 per cent or 240 weeks at $10.92 per week.

History No. 53. (8)

This subject, 57 years old, has his wife and himself to care for. He was employed as a stationary engineer and while oiling an ice machine his arm was drawn into same, causing injuries which resulted in the loss of his left arm above the elbow. His serious injury and his age have made it impossible for him to do any work since the accident took place. His rating was 59¾ per cent or 239 weeks at $17.31 per week. The compensation barely meets his present needs and he feels apprehensive of the future.

History No. 54. (9)

This man is in middle life with a wife dependent upon him for support. He was shipping clerk for a manufacturing firm when he was injured. The injury was caused by striking his shin against some hard object resulting in conditions that finally made amputation necessary, the amputation being 5 inches above knee (left). He was confined to the hospital 17½ weeks. At the present writing he is running a cigar stand. He was given a rating of 51 per cent or 204 weeks compensation.

History No. 55. (10)

This man, a teamster, aged 54 years, was thrown against an electric light pole when his team was frightened by a slide of sand in the Fort Mason tunnel. The injuries necessitated amputation of the leg just below the knee. He was awarded 176 weeks compensation at $20.83, on a permanent disability rating of 44 per cent.

History No. 56. (11)

This man, 29 years old, is not married and has no one to provide for except himself. He was a miner, and was injured by a pick falling upon him and striking him on the back. His spine and neck are so stiffened that he can not straighten himself. His rating was fixed at 19.1 per cent or 77 weeks and the compensation at $10.37 per week.

History No. 57. (12)

This 19-year-old youth was operating a donkey engine in a logging camp when his left leg was crushed between a log and a bunker. His leg was amputated above the knee. For this injury he was given a rating of 44½ per cent permanent disability, carrying with it 178 weeks compensation at $10.31 per week.

History No. 58. (13)

This man, 39 years old, has a wife, mother and niece to provide for. He is at present earning a wage of $110 per month, but thinks if it were not for the consideration of his friend he would find it hard to get work. His injury consists in the loss of his left hand through the metacarpal bones, and the loss of the thumb at the distal joint. His loss of time due to the accident was three and a half months. He was awarded a rating of 39 per cent or 156 weeks at $17.81 per week.

History No. 59. (14)

This subject is 35 years of age, has no family to care for, and no responsibilities except his own maintenance. His injury consists in the loss of his left leg below the knee. He has not attempted to do any work since the accident. His rating is 47¼ per cent or 189 weeks. His compensation is $15.56 per week.

History No. 60. (15)

This subject is a Portuguese, and had been in the United States about five years when he met with the accident. He was a boat hand, and was helping to fasten a boat when the rope caught his foot and tore it literally off the leg. Altogether he spent 11 weeks in the hospital. Up to this interview he had not done any work, owing to lack of training for anything but manual labor. He was given a rating of 36 per cent or 144 weeks at $12.93 per week. He has a wife and one child to provide for.

Study of 65,741 Temporary Injuries in 1915.

Sixty-five thousand seven hundred forty-one temporary injuries were reported in 1915, or an increase of 5,500 or 9.1 per cent over the 1914 temporary injury experience.

During the first six months of 1916, reports of 39,409 temporary injuries were received by the department, or an increase in 1916 reporting of about 30 per cent over 1914.

The following comparison of the different industries' experience in temporary injuries for the thirty months of 1914, 1915 and half of 1916, should be of interest in this connection:

Industry	1914	1915	First six months, 1916
Agriculture	2,107	3,249	1,559
Construction work	9,000	7,718	4,872
Mining and quarrying and oil	7,849	8,188	4,770
Manufacturing	18,433	21,272	12,788
Service (hotels, laundries and all clerical work)	2,328	3,367	2,515
Mercantile trades	5,097	6,283	3,612
Transportation (steam and waterways), also public utilities	15,365	15,655	9,257
Unknown and unclassified	62	9	36
Totals	60,241	65,741	39,409

Causes of These Injuries.

The conditions of machines in motion or being repaired while idle, together with all the circumstances of fatigue and general carelessness while around machinery, caused 9.3 per cent of the injuries of this class, or	6,115
Handling inherently dangerous substances, or working in and around such conditions or substances, such as hot liquids, caustics, acids or broken glass, nails, slivers, etc., caused or occasioned 19.29 per cent of these injuries, or	12,687
Falling, rolling and flying objects were responsible for nearly 17 per cent of these injuries, or	11,171
Injuries due to workmen falling from ladders which either broke or slipped, or from scaffolds which were poorly guarded or which collapsed; also falls on smooth surfaces, etc., 11.8 per cent, or	7,796
Accidents arising out of the circumstances included under the detailed statement of "General or all Other Causes" which follows, were responsible for 39.9 per cent of the injuries, or	26,147

Causes unknown, or not specified, amounted to 2.7 per cent of the injuries, or 1,825.

65,741 TEMPORARY INJURIES.

Grouped by Main and Specific Causes.

Time: 12 months—January 1 to December 31, 1915.

6,115 Temporary Injuries Due to Machinery.

Air hammers and riveters and all compressed air engines and devices, 343. Back-fires of motors and engines when cranking or starting, 650. Slipping, breaking, etc., of power transmitting belts (main), 220. Slipping, breaking, etc., of power transmitting belts (secondary), 70. Chain transmission, 69. Drills, dies, punches, metal stamps and presses, 293. Dynamos, 9. All platform elevators, including skips and buckets, 296. Electric fans, motors, etc., 73. Emery wheel accidents, 175. Explosions of steam containers, 17. Feed rolls of all classes, including mangles and body ironers in laundries, 172. Friction wheels, 7. Gas engines or internal combustion motors, 90. Gears and cogs, 275. All hoisting apparatus, other than platform elevators, 622. Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers, 259. Pile-drivers and bull-dozers, 18. Power-driven saws, either band or circular, 596. Set screws, 34. Shafting and conveyers, 123. Shears, cutters, grinders, used in the preparation of food stuffs, 143. Shears and cutters used in the working of metals and the manufacturing of paper, textiles, etc., 97.

Steam engines, 144. Steam piping, 6. Treadmills and windlasses, 47. Wind motors or wind turbines, 1. Lathes, 65. Machinery without mechanical power, such as jacks, levers, etc., 342. All injuries not otherwise classified caused by machinery peculiar to the agricultural industry, 58. All injuries not otherwise classified, caused by machinery peculiar to the manufacturing of brick, cement, concrete, etc., 8. All injuries not otherwise classified, caused by machinery peculiar to the industry of construction, 212. All injuries not otherwise classified, caused by machinery peculiar to laundries, 31. All injuries not otherwise classified, caused by machinery peculiar to the manufacturing of leather and rubber, 13. All injuries not otherwise classified, caused by machinery peculiar to the lumbering industry, 67. All injuries not otherwise classified, caused by machinery peculiar to the working of metals and the manufacturing of machinery, 100. All injuries not otherwise classified, caused by machinery peculiar to the operating of mines and quarries, 27. All injuries not otherwise classified, caused by machinery peculiar to the extraction of oil, 20. All injuries not otherwise classified, caused by machinery peculiar to printing and the manufacturing of paper, 92. All injuries caused by machinery peculiar to the manufacturing of textiles and clothing which are not otherwise classified, 63. All other machines, 168.

12,687 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 301. Powder, 106. Dynamite, 58. Explosion and combustion of gases, 232. Explosion and combustion of petroleum, 25. Explosion and combustion of benzine, 124. Flames from ovens, oil burners, furnaces, etc., 135. Other fires, unprotected blazes, etc., 203. Hot metals, slags, ashes, etc., and other hot materials, 785. Steam, hot water and other hot liquids, 866. Caustics, alkalies, acids, quicklime, etc., 614. Inhaling of poisonous gases, 79. Splinters, slivers, glass, nails and other sharp objects, 8,740. All other materials, poisonous or inherently dangerous, 419.

11,171 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stones, sand and earth, including cave-ins, etc., 1,652. Falling buildings, walls and similar structures, 49. Falling scaffolds and stagings due to being improperly constructed or supported, 60. Falling piles of material such as lumber, etc., 424. All flying objects, including flying particles of steel, emery, etc., 6,169. All other classes of falling and rolling objects not included in the above classes, 2,817.

7,796 Temporary Injuries Due to Personal Falls.

Falls from ladders due to loss of balance or due to ladder slipping, breaking or collapsing, 706. Falls on or from stairs due to loss of balance or slipping, or due to defects in construction of stairs, etc., 460. Falls from scaffolds due to slipping or loss of balance or due to improper construction of same, 403. Falls from buildings in course of construction, 88. All falls from windows, including those where proper safeguards are not provided or where injured neglects to use same, 14. Falls from roofs, due to slipping or losing balance or lack of proper guards, 72. All other falls from elevations which can not conveniently be grouped under the above classifications, 1,595. Falls into shafts due to slipping or falling or due to shaft being improperly protected, 39. Falls into excavations due to slipping or losing balance, etc., 91. Falls into cellars, 20. Falls into wells, 1. Falls into all other unprotected openings, 222. Slipping or falling on even ground or ordinary surfaces, 2,066. All other falls not otherwise classified, 2,019.

26,147 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in discharge of duties, 172. All injuries due to animal agency, including kicks, bites, etc., 1,534. Carriage accidents, including all animal-drawn vehicles, 933. All injuries due to revolvers and guns, 61. Hand tools and hand machinery such as hammers, knives, axes, etc., 6,250. All intoxication cases, 61. All motor-driven vehicle accidents, 1,122. Occupational diseases, including infections and disorders arising from working conditions, 447. Railroad and street car accidents, 747. Riding accidents, either being thrown or falling from horses or bicycles, 446. Running into or striking stationery objects, protruding or otherwise, 1,944. All shipping and navigation accidents, 32. Transporting or handling heavy weights, 3,531. Objects slipping or falling while handling or working with same, 6,564. Swinging or rebounding objects that are attached to foundations, 912. All other cases, not included in the above classes, 1,391.

Injuries where the cause is unknown, 1,825.

TABLE No. 22.

Time Lost in Days, Payments of Compensation and Medical Fees, by Chief Causes.

The following table sets forth the losses in time by the workman, also the losses in money to employers and insurance companies due to these causes which were just outlined above and which follow in more detail:

65,741 Temporary Injuries.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	76,578	$68,870 00	$79,319 94	$148,189 94
Dangerous substances	88,232	51,913 00	107,974 27	159,887 27
Falling, rolling and flying objects	87,179	76,810 00	90,989 18	167,799 18
Personal falls	143,737	163,793 00	132,465 09	296,258 09
General or all other causes	309,895	233,284 00	288,719 96	522,003 96
Unknown	8,422	7,809 00	10,246 48	18,055 48
Totals	714,043	$602,479 00	$709,714 92	$1,312,193 92

TABLE No. 23.

Analysis of 3,249 Temporary Injuries Occurring to Employees Engaged in Agriculture and Its Neighboring Pursuits—Chief Causes, Losses in Time to Workman and Also the Losses in Money to Employers and Insurance Companies.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	5,395	$5,076 00	$7,819 58	$12,895 58
Dangerous substances	4,578	2,172 00	6,578 98	8,750 98
Falling, rolling and flying objects	2,632	1,982 00	3,391 38	5,373 38
Personal falls	8,404	6,546 00	8,754 00	15,300 00
General or all other causes	29,936	20,745 00	36,778 23	57,523 23
Unknown	720	703 00	605 75	1,308 75
Totals	51,665	$37,224 00	$63,927 92	$101,151 92

TABLE No. 24.

Analysis of 7,718 Temporary Injuries Occurring to Employees Engaged in All Forms of Construction Work—Chief Causes, Losses in Time of Workman and Also the Losses in Money to Employers and Insurance Companies.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	8,293	$11,707 00	$8,496 84	$20,203 84
Dangerous substances	14,192	11,679 00	17,319 04	28,998 04
Falling, rolling and flying objects	16,390	20,878 00	20,086 99	40,964 99
Personal falls	29,412	51,663 00	32,133 52	83,796 52
General or all other causes	40,201	41,281 00	41,904 13	83,185 13
Unknown	1,319	1,883 00	1,487 74	3,370 74
Totals	109,807	$139,091 00	$121,428 26	$260,519 26

TABLE No. 25.

Analysis of 8,188 Temporary Injuries Occurring in the Extraction of Minerals and Oil From the Earth, Also Quarrying—Chief Causes, Losses in Time to Workman and Also the Losses in Money to Employers and Insurance Companies.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	6,600	$7,100 00	$8,955 98	$16,055 98
Dangerous substances	8,535	5,393 00	9,871 75	15,264 75
Falling, rolling and flying objects	20,859	18,219 00	21,853 86	40,072 86
Personal falls	11,289	14,450 00	10,939 29	25,389 29
General or all other causes	28,212	19,646 00	27,236 93	46,882 93
Unknown	751	715 00	790 10	1,505 10
Totals	76,246	$65,523 00	$79,647 91	$145,170 91

TABLE No. 26.

Analysis of 21,272 Temporary Injuries Occurring to Employees Engaged in All Kinds of Manufacturing—Chief Causes, Losses in Time to Workman and Also Losses in Money to Employers and Insurance Companies.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	34,872	$26,043 00	$34,363 30	$60,406 30
Dangerous substances	27,060	12,578 00	37,521 89	50,099 89
Falling, rolling and flying objects	23,479	17,380 00	26,776 37	44,156 37
Personal falls	30,448	30,658 00	27,712 84	58,370 84
General or all other causes	74,691	53,966 00	73,605 98	127,571 98
Unknown	2,552	2,531 00	4,065 28	6,596 28
Totals	193,102	$143,156 00	$204,045 66	$347,201 66

TABLE No. 27.

Analysis of 3,367 Temporary Injuries Occurring to Employees Engaged in Specialized Occupations or Businesses Where no Commodity is Manufactured or Produced, but Where Service is Sold; Skilled, Unskilled, Professional, etc., i.e., Hotels, Office Buildings, Clubs, Resorts, Hospitals, Schools, Churches, Libraries, Amusement Places, etc.—Chief Causes, Losses in Time to Workman, and Also Losses in Money to Employers and Insurance Companies.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	4,310	$3,788 00	$4,953 60	$8,741 60
Dangerous substances	6,744	4,318 00	9,379 89	13,697 89
Falling, rolling and flying objects	1,464	564 00	1,621 09	2,185 09
Personal falls	13,463	17,234 00	16,738 66	33,972 66
General or all other causes	13,353	11,894 00	18,222 15	30,116 15
Unknown	392	112 00	441 05	553 05
Totals	39,726	$37,910 00	$51,356 44	$89,266 44

TABLE No. 28.

Analysis of 6,283 Temporary Injuries Occurring to Employees Engaged in the Mercantile Trades; No Manufacturing, No Construction, Only Light Forms of Transportation Where Own Teams are Operated—Chief Causes, Losses in Time to Workman and Also the Losses in Money to Employers and Insurance Companies.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	5,548	$4,544 00	$6,761 37	$11,305 37
Dangerous substances	9,877	4,180 00	13,444 89	17,624 89
Falling, rolling and flying objects	3,078	2,113 00	5,262 39	7,375 39
Personal falls	14,661	13,786 00	14,658 89	28,444 89
General or all other causes	30,140	23,246 00	35,849 00	59,095 00
Unknown	1,490	1,156 00	1,772 49	2,928 49
Totals	64,794	$49,025 00	$77,749 03	$126,774 03

TABLE No. 29.

Analysis of 15,655 Temporary Injuries Occurring to Employees Engaged in All Forms of Transportation Service, Such as Steam and Electric Railroads, Ocean and River Steamers, Ferry and Bay Boats, Stage and Auto Bus Lines, etc.; Included in This Total are Temporary Injuries Occurring to Employees Engaged in Public Utilities, Water and Lighting Plants, etc.—Chief Causes, Losses in Time to Workman, and Also the Losses in Money to Employers and Insurance Companies.

Cause	Time lost in days	Compensation	Medical benefits	Total
Machinery	11,560	$10,612 00	$7,969 27	$18,581 27
Dangerous substances	17,246	11,593 00	13,857 83	25,450 83
Falling, rolling and flying objects	19,277	15,674 00	11,997 10	27,671 10
Personal falls	36,060	29,456 00	21,527 89	50,983 89
General or all other causes	93,328	62,456 00	55,123 54	117,579 54
Unknown	1,148	650 00	1,035 97	1,685 97
Totals	178,619	$130,441 00	$111,511 60	$241,952 60

NOTE.—Nine temporary injury reports did not bear sufficient data at time of this report to classify the industry in which they occurred. The time lost due to these injuries was 84 days, payments for compensation amounted to $109, and medical benefits totaled $48.10.

Number of Compensable Injuries in 1915.

Of the 65,741 temporary injuries occurring in 1915, 13,254 or 20.16 per cent, were injuries causing a disability of fifteen days or more and were therefore, compensable cases. These compensable and noncompensable cases divided up by the industries in which they occurred, show the following interesting order of responsibility:

Industry	Over 15 days	Under 15 days	Unknown	Total
Manufacturing	3,593	17,037	642	21,272
Transportation	3,321	11,703	631	15,655
Construction	1,941	5,251	526	7,718
Mining and quarrying	1,409	6,526	253	8,188
Mercantile trades	1,282	4,649	352	6,283
Agriculture	988	1,851	410	3,249
Service	718	2,423	226	3,367
Unknown	2	5	2	9
Totals	13,254	49,445	3,042	65,741

Disability Chart No. 14.

Chart No. 14 compares the 1914 and 1915 temporary injuries by time lost in day periods up to the fourteenth day. Cases over fourteen days are compared on a weekly time loss basis. The solid line is for 1914, and the hatched line for 1915. The scale is 4,000 injuries per inch of height.

COMPARATIVE CHART OF TIME LOST IN DAYS AND WEEKS (TEMPORARY DISABILITY)

1914: – 60,241 ■
1915: – 65,741 ▨

THE LENGTH OF THE LINE IS DETERMINED BY THE TIME LOST IN DAYS AND IN WEEKS

NOTE:– 371 CASES IN 1914 CAUSED A LOSS OF 20 TO 95 WEEKS. 329 CASES IN 1915 CAUSED A LOSS OF 21-63 WEEKS.

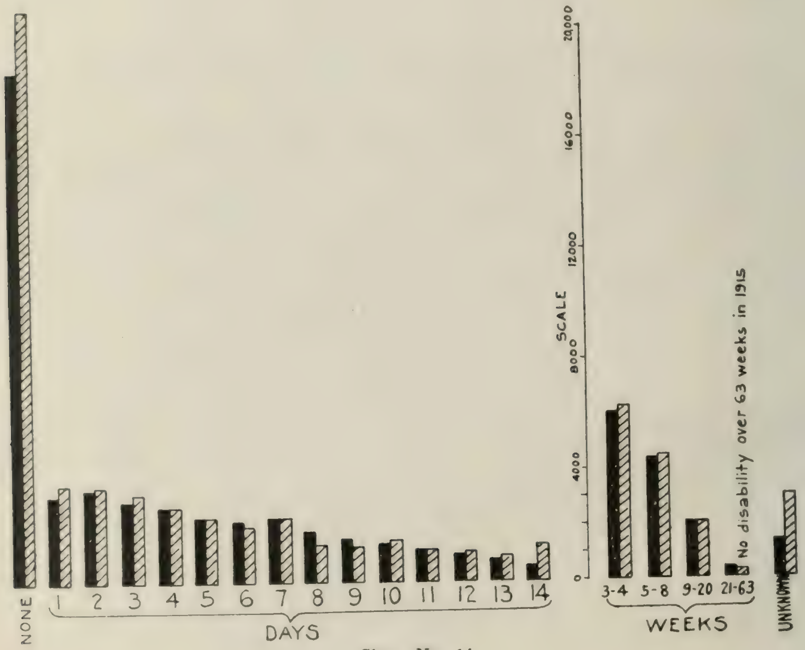


Chart No. 14.

Table No. 30 is a distribution of the 65,741 temporary injuries in 1915 by two-day periods of disability. It will be noted that many cases of temporary injuries run well over the two hundred mark, and eighteen cases show a disability of from 300 to 440 days.

TABLE No. 30.

65,741 Temporary Injuries.

Time: 12 Months—January 1 to December 31, 1915.

Table Showing Disability by Two-day Periods.

Period of disability in days	Number of cases	Period of disability in days	Number of cases	Period of disability in days	Number of cases
Unknown	3,053	101–102	36	207–208	3
None	20,700	103–104	35	209–210	7
1– 2	7,076	105–106	27	211–212	3
3– 4	6,021	107–108	24	213–214	6
5– 6	4,495	109–110	31	215–216	1
7– 8	3,743	111–112	27	217–218	5
9– 10	2.942	113–114	21	219–220	4
11– 12	2,188	115–116	21	221–222	3
13– 14	2,279	117–118	15	223–224	2
15– 16	1,284	119–120	36	225–226	2
17– 18	984	121–122	12	227–228	3
19– 20	888	123–124	17	229–230	2
21– 22	1,015	125–126	30	231–232	2
23– 24	757	127–128	17	233–234	3
25– 26	626	129–130	9	235–236	2
27– 28	749	131–132	8	239–240	4
29– 30	636	133–134	15	241–242	1
31– 32	512	135–136	10	243–244	1
33– 34	395	137–138	11	245–246	3
35– 36	495	139–140	25	247–248	3
37– 38	323	141–142	14	249–250	3
39– 40	284	143–144	11	251–252	3
41– 42	359	145–146	8	253–254	1
43– 44	279	147–148	14	257–258	2
45– 46	246	149–150	17	259–260	4
47– 48	225	151–152	14	265–266	2
49– 50	257	153–154	11	267–268	2
51– 52	153	155–156	6	269–270	2
53– 54	147	157–158	8	271–272	2
55– 56	182	159–160	9	273–274	1
57– 58	155	161–162	11	279–280	3
59– 60	159	163–164	3	283–284	1
61– 62	128	165–166	7	293–294	1
63– 64	135	167–168	8	295–296	2
65– 66	96	169–170	6	299–300	1
67– 68	90	171–172	7	303–304	1
69– 70	108	173 174	6	307–308	1
71– 72	88	175–176	8	311–312	1
73– 74	68	177–178	2	313–314	1
75– 76	62	179–180	5	321–322	1
77– 78	85	181–182	5	329–330	1
79– 80	52	183–184	9	339–340	1
81– 82	44	185–186	4	349–350	3
83– 84	58	187–188	2	369–370	1
85– 86	56	189–190	7	379–380	1
87– 88	39	191–192	4	381–382	1
89– 90	51	193–194	1	389–390	1
91– 92	58	195–196	2	405–406	1
93– 94	33	197–198	3	413–414	1
95– 96	37	199–200	3	439–440	1
97– 98	56	203–204	2		
99–100	34	205–206	5	Total	65,741

Disability by Character of Medical Treatment.

In the foregoing we have considered the injuries with respect to the time lost and the chief causes for the loss, also the industries in which the injuries occurred by the periods of disability, but in the following chart, No. 15, and Table No. 31, the injuries for 1914 and 1915 are analyzed with a view to showing the effect in loss of time due to the character of the medical treatment.

The 1915 experience is a little better basis for the averages as the reporting was better, as is seen from the fact that 65.05 per cent of the cases of temporary injuries were reported as cases cared for by a private doctor paid a specific fee, while in 1914 this class amounted to only 53.62 per cent of the total.

It will be noted that there was little change in the number of injuries cared for under contract or by company hospitals, especially if this difference is looked at in the light of the increase in the above-mentioned class.

There was a day less time lost on an average among the cases cared for by private doctors paid a specific fee; the average time lost in this class of cases being 20 days in 1914 and 19 days in 1915.

Where the injuries were cared for by contract or in company hospitals, both years' experience shows a decrease in the average time lost, due to this class of treatment over the former class, of five days, the average time lost being 15 days in 1914 and 14 days in 1915.

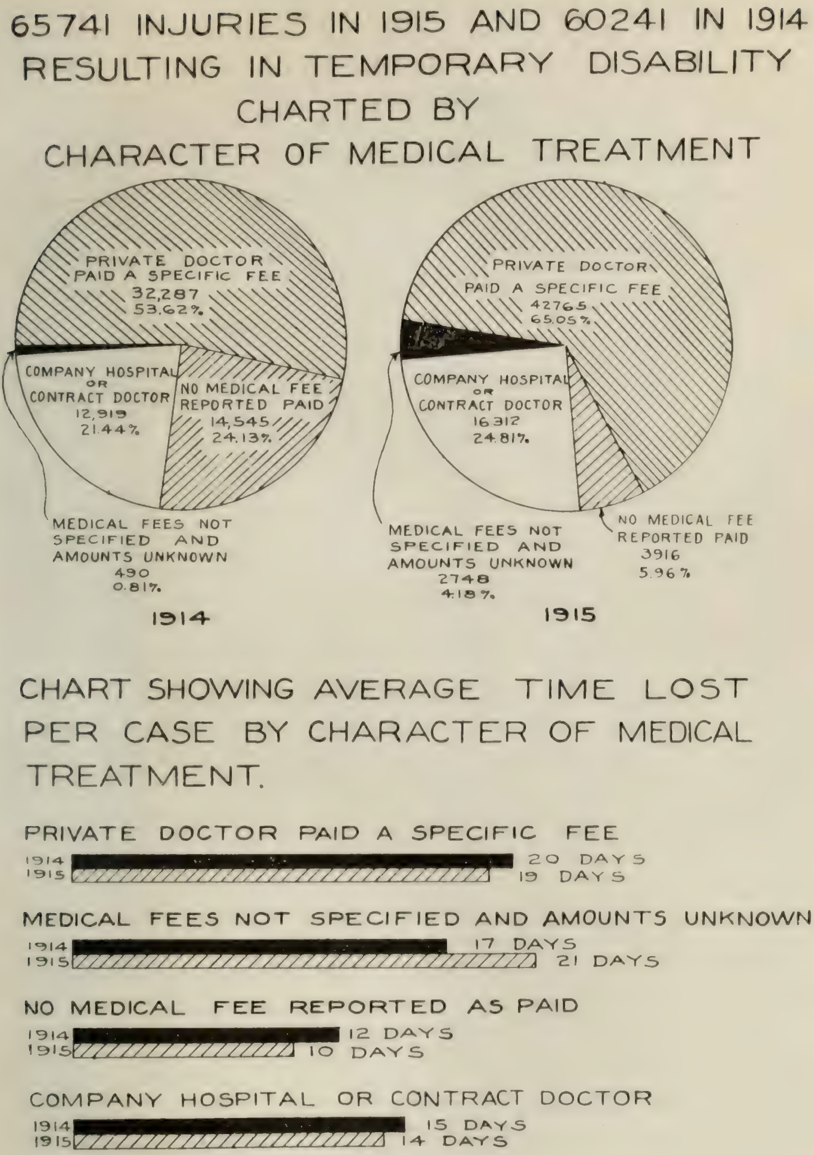

65741 INJURIES IN 1915 AND 60241 IN 1914
RESULTING IN TEMPORARY DISABILITY
CHARTED BY
CHARACTER OF MEDICAL TREATMENT
PRIVATE DOCTOR PAID A SPECIFIC FEE 32,287 53.62%
COMPANY HOSPITAL OR CONTRACT DOCTOR 12,919 21.44%
NO MEDICAL FEE REPORTED PAID 14,545 24.13%
MEDICAL FEES NOT SPECIFIED AND AMOUNTS UNKNOWN 490 0.81%
1914
PRIVATE DOCTOR PAID A SPECIFIC FEE 42765 65.05%
COMPANY HOSPITAL OR CONTRACT DOCTOR 16312 24.81%
MEDICAL FEES NOT SPECIFIED AND AMOUNTS UNKNOWN 2748 4.18%
NO MEDICAL FEE REPORTED PAID 3916 5.96%
1915
CHART SHOWING AVERAGE TIME LOST PER CASE BY CHARACTER OF MEDICAL TREATMENT.
PRIVATE DOCTOR PAID A SPECIFIC FEE
1914 20 DAYS
1915 19 DAYS
MEDICAL FEES NOT SPECIFIED AND AMOUNTS UNKNOWN
1914 17 DAYS
1915 21 DAYS
NO MEDICAL FEE REPORTED AS PAID
1914 12 DAYS
1915 10 DAYS
COMPANY HOSPITAL OR CONTRACT DOCTOR
1914 15 DAYS
1915 14 DAYS

Chart No. 15.

Table No. 31 will be found useful when more extended and detailed studies in this direction are desired.

TABLE No. 31.

65,741 Temporary Injuries.

Time: 12 Months—January 1 to December 31, 1915.

Table Showing Character of Medical Treatment by Days and Weeks of Disability.

Period of disability	Where company hospital or contract doctors cared for injured	Medical fees not specified and amounts unknown	No medical fee paid	Where private doctor was paid a specific fee for services	Totals
Unknown	249	1,877	274	653	3,053
None	5,746	283	301	14,370	20,700
1 day	905	58	428	2,180	3,571
2 days	1,064	42	413	1,986	3,505
3 days	1,002	39	386	1,812	3,239
4 days	840	28	271	1,643	2,782
5 days	727	20	238	1,427	2,412
6 days	571	29	206	1,277	2,083
7 days	560	29	192	1,582	2,363
8 days	361	13	115	891	1,380
9 days	346	16	107	893	1,362
10 days	355	18	122	1,085	1,580
11 days	279	17	69	742	1,107
12 days	251	15	86	729	1,081
13 days	226	13	65	685	989
14 days	242	19	93	936	1,290
3d week	844	57	219	2,651	3,771
4th week	477	48	110	1,897	2,532
5th week	344	32	65	1,387	1,828
6th week	220	10	40	906	1,176
7th week	161	20	38	675	894
8th week	112	10	17	456	595
9th week	88	11	12	406	517
10th week	58	9	11	276	354
11th week	58	2	1	208	269
12th week	37	8	6	137	188
13th week	33	2	9	130	174
14th week	32	3	2	119	156
15th week	22	1	3	92	118
16th week	18	1	3	74	96
17th week	9	1		58	68
18th week	7	5	1	71	84
19th week	6	2	1	34	43
20th week	11			41	52
21st week	7	1		29	37
22d week	8	2	1	41	52
23d week	8	1	2	16	27
24th week	3			22	25
25th week	5	2	1	17	25
Over 25 weeks	20	4	8	131	163
Totals	16,312	2,748	3,916	42,765	65,741
Average time lost per injury	14 days	21 days	10 days	19 days	

Grand average time lost per injury 17 days

Character of Coverage and Costs.

In the 43,610 cases of temporary injury reported in 1915 as being covered by state and private insurance companies, $450,314 were paid to the injured workmen and $565,668.29 were paid to physicians and hospitals for their services. If we consider the total number of cases reported under the requirements of the law, and draw our average costs from them, we have an average of $10.33 for compensation costs per case, and $12.97 for medical costs. However, it must be remembered that only 20.16 per cent of the injuries were compensable and that 65.5 per cent were cases upon which a specific fee for medical services was paid, and average costs in compensation and medical fees based only on these cases would naturally be higher. Considering only these cases we have an average of $51.36 for compensation and $16.60 for medical costs, the average being based only on cases considered and not the total number reported.

In 20,885 cases of 1915, injuries insurance was not carried. This class of injuries consisted largely of injuries to employees engaged in the transportation industry, public utilities, mining, oil fields, farms, etc. Considering the average for this class in the same manner as above, we find that compensation payments amounted to $7.23 per case and the medical costs per case amounted to $6.83. The total compensation paid in these cases was $151,072, and the total medical payments amounted to $142,708.32.

In 1,246 injury cases it could not be determined in time for tabulation whether insurance was carried or not. These amounts and averages for this group are added only for the sake of record as the number is too small to mean much; $1,093 was paid in these cases for compensation or an average of 87 cents per case. The medical costs were $1,338.31 with an average of $1.07 per case.

Injuries to Employees Engaged in Interstate Commerce.

It is difficult if not impossible to discriminate between employees engaged in interstate traffic and those who are not so engaged. But for our purposes of segregation of injuries cared for under "company hospital" and "contract doctor" plans, this discrimination is not necessary as nearly all employees of the large railroads are cared for in this manner irrespective of their occupational classification. The number of injuries to this class of employees reported during 1915 was 9,348; 162 of these were permanent injuries and 98 were fatalities.

Considering the different classes of injuries and the different conditions of medical treatment and drawing averages therefrom, we have the following:

Temporary injuries treated at company hospital were 7,754. The average cost per case for medical treatment in these cases has been variously estimated from 18 cents to $1.46. Although the estimated average is not official, it comes from good authority on the subject.

The average time lost in these 7,754 temporary injury cases receiving treatment at company hospitals was 8.7 days and the average compensation reported paid was $1.86.

There were 933 temporary injuries in which a specific fee was paid for the physician's services, at an average cost of $22.45. The average compensation payment in these cases was $25.64, and the time lost averaged 19.08 days.

Four hundred one cases did not bear sufficient evidence of the character of the medical treatment or the time loss or compensation payments, to be properly classified.

In 52 cases of permanent injuries to employees engaged in interstate traffic and which were treated at company hospitals—average cost of medical attention not known—the compensation payments averaged $667.04 per case.

In 95 other cases of injury of the same or similar character and to the same class of employees, who received treatment by physicians paid a specific fee, the average was only $9.79, and the compensation averaged $49.76. These figures are too small and contain too many unknown factors of special contracts and circumstances to reflect any true lines of the actual conditions. Information of 15 other permanent injuries was too abridged to be of value.

Considering the 98 fatal injuries to this class of employees, we find burial and medical payments so irregular as to be misleading. The same is true of the compensation payments in these same cases where a division into character of medical treatment renders an average of $145.45 for compensation in eight cases, $808.22 in seven cases, and $216.85 per case in 19 cases.

Average Costs by Insurance Companies.

This study of average compensation and medical costs is based upon groups of insurance companies whose experience for 1915 was (1) 4,000 or more injuries; (2) from 3,000 to 4,000; (3) 2,000 to 3,000; (4) 1,000 to 2,000; (5) 400 to 1,000; (6) all others. Further, the averages are derived from the total number of injuries reported as bona fide under the terms of the Act and without regard to whether or not some payment was made in each case. In view of this fact it must be added that the chief service of these averages is one of ratios and that they do not reflect the actual conditions in the manner that the second set of averages does which follows these, and which were determined on a proper segregation of the cases giving due regard to whether each and every case bore evidence of compensation and medical payments or not.

The insurance companies covering 43,610 injuries are divided into six groups:

(1) Those who had an injury experience of 4,000 or more:

	Number of cases	Average compensation paid	Average medical costs
(a)	4,594	$12 25	$12 30
(b)	4,394	10 26	14 28

(2) Those who had an experience ranging from 3,000 to 4,000 injuries:

	Number of cases	Average compensation paid	Average medical costs
(c)	3,895	$10 29	$12 35
(d)	3,047	10 32	13 42

(3) Those who had an experience ranging from 2,000 to 3,000 injuries:

	Number of cases	Average compensation paid	Average medical costs
(e)	2,383	$7 21	$12 31
(f)	2,361	8 40	11 10
(g)	2,322	12 61	12 81

(4) Those who had an experience ranging from 1,000 to 2,000 injuries:

	Number of cases	Average compensation paid	Average medical costs
(h)	1,844	$8 16	$11 65
(i)	1,524	14 90	17 18
(j)	1,498	11 67	14 36
(k)	1,406	8 95	12 83
(l)	1,363	12 66	14 93
(m)	1,340	4 57	8 41
(n)	1,250	10 51	13 20
(o)	1,223	9 00	12 62
(p)	1,167	13 88	15 33
(q)	1,145	9 42	14 66

(5) Those who had an experience ranging from 400 to 1,000 injuries:

	Number of cases	Average compensation paid	Average medical costs
(r)	925	$8 83	$12 02
(s)	751	8 49	10 15
(t)	706	6 90	11 58
(u)	406	6 98	7 05

(6) All others:

	Number of cases	Average compensation paid	Average medical costs
(v)	4,066	$11 43	$13 53

Average Compensation and Medical Costs by Insurance and Noninsurance.

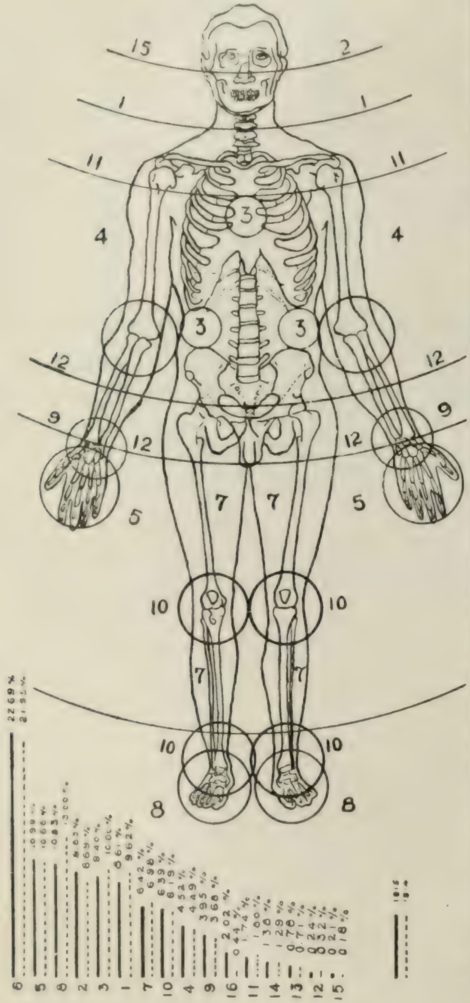
The following averages are based only on cases in which either compensation or medical payments were made, and do not include all injuries reported.

The number of cases in which compensation was paid was 11,730, at an average of $51.36, including all compensation cases under insurance and not under insurance.

The average medical costs on the 42,765 cases where fees were paid was $16.60 per case, considering insurance cases and cases not covered by insurance.

Insurance company class number	Number cases where compensation was paid	Average compensation	Number cases where medical fee was paid	Average medical costs
2	535	$58 80	2,629	$16 60
3	117	54 50	601	12 68
4	127	48 22	1,230	9 16
8	287	59 86	2,009	14 60
9	386	51 35	2,002	13 09
10	405	56 07	1,396	18 76
11	159	51 38	840	13 24
13	262	61 82	1,046	17 09
14	893	62 99	3,345	16 90
15	292	59 89	1,385	15 54
16	335	51 51	1,072	18 98
17	229	47 11	1,096	15 32
18	315	47 74	1,584	13 57
23	122	49 90	628	13 02
24	196	56 21	867	17 80
27	636	63 11	2,966	16 22
28	257	51 11	1,100	15 00
30	879	51 43	3,743	16 79
33	457	64 11	1,820	16 76
34	268	46 87	1,038	17 48
All others	859	57 40	3,528	16 41
Unknown	17	64 29	64	20 91
Noninsurance	3,697	40 86	6,756	21 06

65741 INJURIES-TEMPORARY 1915 CHARTED BY PART OF BODY INJURED.



		1914	1915	1914	1915
15	SUNSTROKE EXHAUSTION AND SHOCK	109	138	0.18%	0.21%
14	GENERAL INJURIES TO THE BODY	777	908	1.29%	1.38%
1	HEAD NECK FACE	5795	5663	9.62%	8.61%
2	EYE	5231	6461	8.69%	9.83%
11	SHOULDER	1082	1146	1.80%	1.74%
3	CHEST BACK ABDOMEN	6038	6179	10.00%	9.40%
12	INTERNAL	193	158	0.32%	0.24%
13	HERNIA	430	511	0.71%	0.78%
4	ARM	2704	2973	4.49%	4.52%
9	ELBOW WRIST	2215	2595	3.68%	3.95%
5	HAND	6429	7223	10.66%	10.99%
6	FINGERS	13212	14917	21.95%	22.69%
7	LEG	4201	4218	6.98%	6.42%
10	KNEE & ANKLE	3727	4199	6.19%	6.39%
8	FOOT	7833	7121	13.00%	10.83%
16	UNKNOWN	265	1331	0.44%	2.02%

Chart No. 16.

65,741 Temporary Injuries by Parts of Body Injured.

Chart No. 16 locates the kind of injury the workman received by the part of the body injured. It also compares the 1914 data with the 1915 experience. It seems very remarkable that there should be such a slight difference in the number of times that any one given part of the body was injured in each of the two years. The difference in many cases is measured in tenths and hundredths. For example: In 1914, 0.18 per cent of the injuries reported were sunstrokes, exhaustions and shocks to nerves, while in 1915 this class reached only 0.21 per cent. Hernia injuries in 1914 were 0.71 per cent of all the injuries and 0.78 per cent in 1915.

The parts of the body most frequently injured are the hands and fingers, provided, of course, we consider injuries to feet, knees, ankles and legs separately. The finger injuries in 1914 were 21.95 per cent of the total and in 1915 they were 22.69 per cent. The frequency with which any part of the body is injured determines the position of the solid and dotted lines in the lower left-hand corner of this chart.

TABLE No. 32.

65,741 Temporary Injuries in 1915.

Table Showing Part of Body Injured, Nature of Injury, Average Cost in Compensation and Medical Payments and Average Time Lost in Days.

Nature of injury	Head, neck or face	Eye injuries	Trunk (chest, abdomen, back)	Arms (elbow and wrist)	Hands	Fingers	Legs (knees and feet)	Shoulders	Herniae	Miscellaneous	Unknown	Total
Bruises, cuts, burns and crushes—												
Number of cases	5,238	259	2,324	3,109	5,648	12,636	10,833	548	--------	761	--------	41,356
Average compensation	$4.85	$3.74	$11.99	$4.90	$3.60	$2.99	$7.44	$10.53	--------	$26.71	--------	$5.66
Average medical	$8.82	$8.27	$9.16	$8.89	$7.04	$5.99	$8.95	$9.86	--------	$29.76	--------	$8.16
Average time lost in days	7.29	6.33	13.72	8.69	7.74	6.35	28.40	13.91	--------	22.78	--------	13.42
Infections, skin disorders, etc.—												
Number of cases	80	15	38	335	1,092	1,571	429	5	--------	3	--------	3,568
Average compensation	$6.62	$1.26	$14.71	$5.61	$6.40	$5.03	$12.94	--------	--------	$17.33	--------	$6.57
Average medical	$12.30	$8.95	$31.84	$12.64	$12.75	$11.14	$21.37	$12.74	--------	$11.16	--------	$13.21
Average time lost in days	11.45	6.00	23.28	11.56	12.16	10.75	19.80	8.02	--------	38.33	--------	12.49
Dislocations and strains—												
Number of cases	86	--------	2,777	1,222	148	288	2,880	474	--------	50	--------	7,925
Average compensation	$6.25	--------	$9.54	$8.04	$6.93	$6.51	$11.73	$17.40	--------	$18.10	--------	$10.43
Average medical	$8.97	--------	$9.42	$8.20	$6.03	$5.68	$10.93	$15.29	--------	$20.95	--------	$10.00
Average time lost in days	12.20	--------	13.56	12.81	10.51	8.07	17.72	18.51	--------	18.44	--------	15.00
Fractures—												
Number of cases	191	--------	911	839	138	414	1,205	108	--------	39	--------	3,845
Average compensation	$38.03	--------	$29.15	$62.19	$34.16	$19.54	$88.72	$78.34	--------	$73.53	--------	$56.44
Average medical	$60.31	--------	$28.12	$45.61	$21.42	$15.45	$68.97	$51.51	--------	$53.63	--------	$45.64
Average time lost in days	34.22	--------	27.62	44.25	28.25	23.87	58.44	49.43	--------	55.33	--------	41.74
Eye injuries—												
Number of cases	--------	6,353	--------	--------	--------	--------	--------	--------	--------	--------	--------	6,353
Average compensation	--------	$1.40	--------	--------	--------	--------	--------	--------	--------	--------	--------	$1.40
Average medical	--------	$4.62	--------	--------	--------	--------	--------	--------	--------	--------	--------	$4.62
Average time lost in days	--------	4.52	--------	--------	--------	--------	--------	--------	--------	--------	--------	4.52

Ruptures—												
Number of cases	--------	--------	--------	--------	--------	--------	--------	--------	629	--------	--------	629
Average compensation	--------	--------	--------	--------	--------	--------	--------	--------	$23.63	--------	--------	$23.63
Average medical	--------	--------	--------	--------	--------	--------	--------	--------	$18.15	--------	--------	$18.15
Average time lost in days	--------	--------	--------	--------	--------	--------	--------	--------	22.65	--------	--------	22.65
Injuries from poisonous substances, etc.—												
Number of cases	18	--------	12	26	--------	--------	10	--------	--------	147	--------	213
Average compensation	$3.83	--------	$4.75	$2.50	--------	--------	$0.90	--------	--------	$1.95	--------	$2.28
Average medical	$5.95	--------	$5.29	$10.68	--------	--------	$6.83	--------	--------	$7.69	--------	$7.73
Average time lost in days	10.66	--------	9.33	9.23	--------	--------	7.08	--------	--------	7.47	--------	8.04
Asphyxiation, sunstroke and heat prostration—												
Number of cases	--------	--------	--------	--------	--------	--------	--------	--------	--------	86	--------	86
Average compensation	--------	--------	--------	--------	--------	--------	--------	--------	--------	$2.92	--------	$2.92
Average medical	--------	--------	--------	--------	--------	--------	--------	--------	--------	$9.08	--------	$9.08
Average time lost in days	--------	--------	--------	--------	--------	--------	--------	--------	--------	8.92	--------	8.92
Miscellaneous—												
Number of cases	26	--------	38	30	17	8	71	6	--------	108	--------	304
Average compensation	$13.99	--------	$3.50	$4.43	$2.05	$14.00	$18.56	$96.33	--------	$9.62	--------	$11.95
Average medical	$8.82	--------	$27.56	$10.54	$9.58	$16.80	$19.15	$16.54	--------	$13.50	--------	$15.81
Average time lost in days	16.69	--------	14.97	11.00	6.76	15.25	23.97	69.15	--------	13.01	--------	16.74
Unknown—												
Number of cases	5	5	23	6	21	3	65	3	--------	1	1,330	1,462
Average compensation	--------	--------	$23.74	$15.00	$2.76	$47.00	$41.92	$1079.33	--------	$9.33	$3.75	$8.06
Average medical	$1.65	$0.60	$14.63	$18.65	$5.07	$26.58	$28.56	$67.35	--------	$93.25	$3.65	$5.23
Average time lost in days	--------	3.40	21.43	16.00	11.90	41.66	28.40	73.33	--------	--------	2.69	4.53
Totals—												
Number of cases	5,644	6,632	6,123	5,567	7,064	14,920	15,493	1,144	629	1,195	1,330	65,741
Average compensation	$6.05	$1.49	$13.42	$12.09	$4.69	$3.74	$15.90	$22.98	$23.63	$21.54	$3.75	$9.08
Average medical	$10.60	$4.77	$12.38	$12.31	$8.18	$6.80	$14.46	$16.24	$18.15	$24.50	$3.65	$10.58
Average time lost in days	8.38	4.59	15.80	12.84	8.89	7.34	28.48	19.59	22.65	19.91	2.69	14.24

Average Costs of Injuries to Any Part of the Body.

The preceding table, No. 32, and charts Nos. 17, 18, 19 and 20, set forth five very interesting items: (1) The number of injuries occurring to any part of the body; (2) the nature of the injury; (3) the average time lost in recovery; (4) the average amount of compensation paid to the workman during this period of recovery; (5) the costs of the medical attention for relief.

Correlations of the injuries and parts of body, costs and time lost are set forth in both table and charts, but the charts make use of the third dimension to aid the senses in quick comparison.

The height of the column in chart No. 17, subnumbered 1, is determined by the number of injuries occurring to any particular part of the body due to any particular cause.

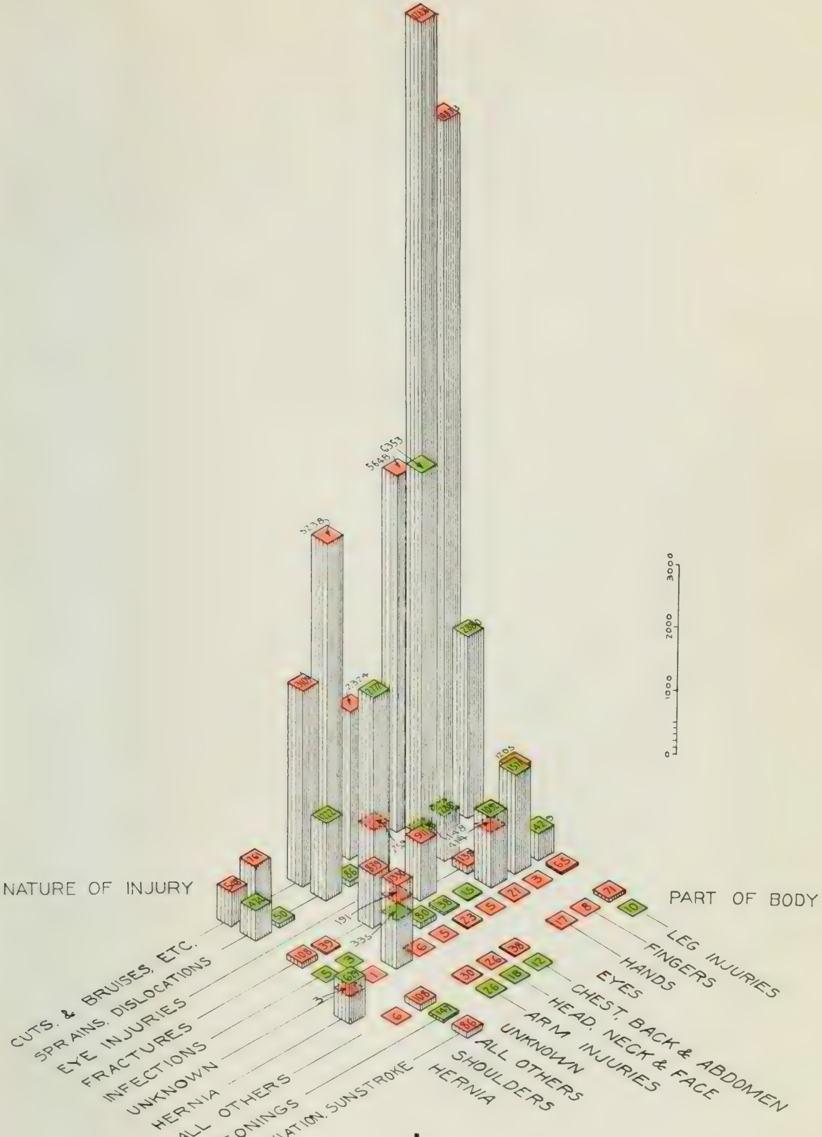
The height of the column in chart No. 18, subnumbered 2, is determined by the average time lost in days due to any given group of similar injuries occurring to any particular part of the body.

The heights of the columns in charts Nos. 19 and 20, subnumbered 3 and 4, respectively, are determined by the average payments of compensation and medical fees for any given group of injuries to any given part of the body.

There were some mechanical difficulties encountered in the construction of these charts which necessitated an arbitrary grouping of injuries and parts of body injured in order that some columns would not obliterate others. In one case a column was so high that it had to be broken and part of the top section omitted. One other column was too long to stand in front of the others and was broken off and raised up out of position. Both of these columns occur in chart No. 19, subnumbered 3.

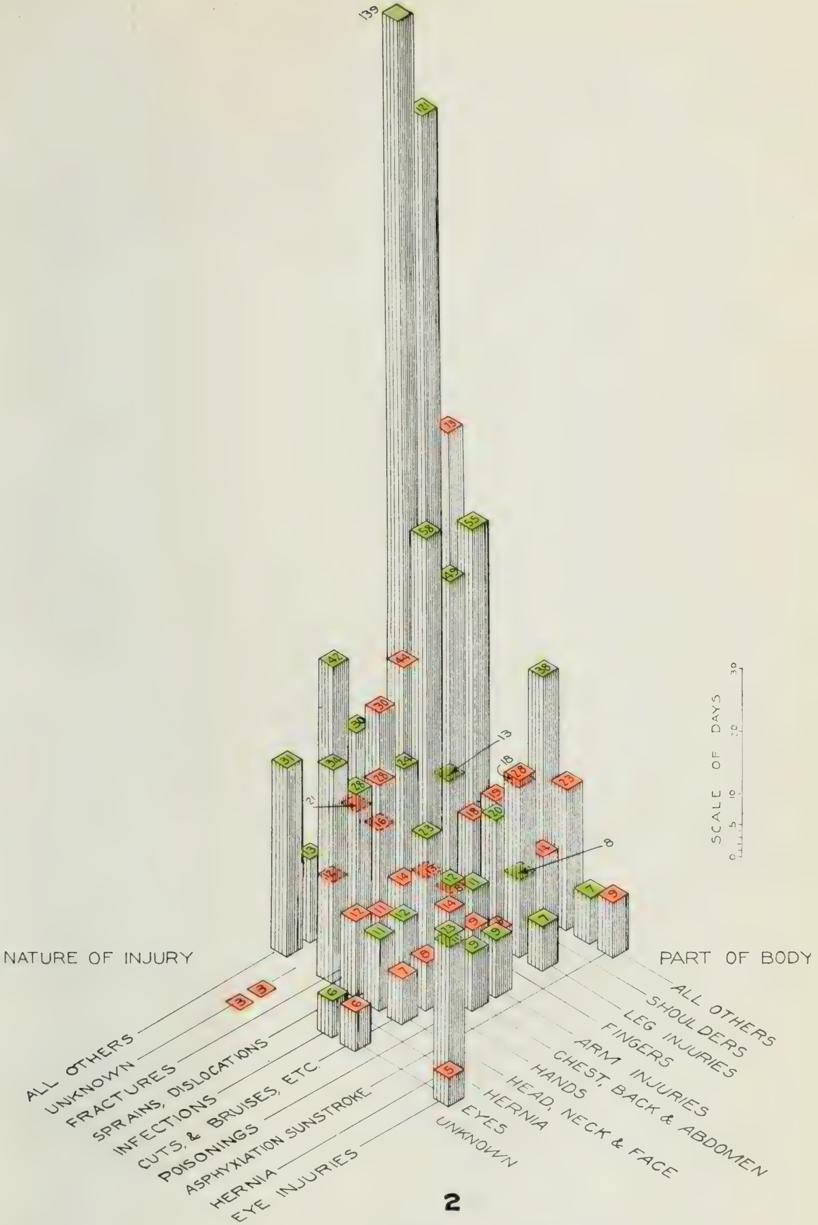
It would have been easier to read the four charts in combination if the correlated factors had followed a scale of ascension or descension, but on account of the irregularity of the relationship of some classes of injuries and their severity measured in costs, the position of some of the groups had to be changed. For example, in chart No. 17, subnumbered 1, eye injuries take third place in the order of "Nature of Injury", and "Part of Body", while in chart No. 18, subnumbered 2, these injuries take tenth place.

The highest column in chart No. 17, subnumbered 1, refers to the 12,636 bruising and cutting injuries occurring to the fingers, and the very short and obscure column in the block at the junction of line four, "fingers", under "Part of Body", and line six, "Cuts and Bruises", under "Nature of Injury" on chart No. 18, subnumbered 2, shows that the time lost due to cuts and bruises of fingers, averages about six days (6.35 per cent). The third correlated factor of average compensation



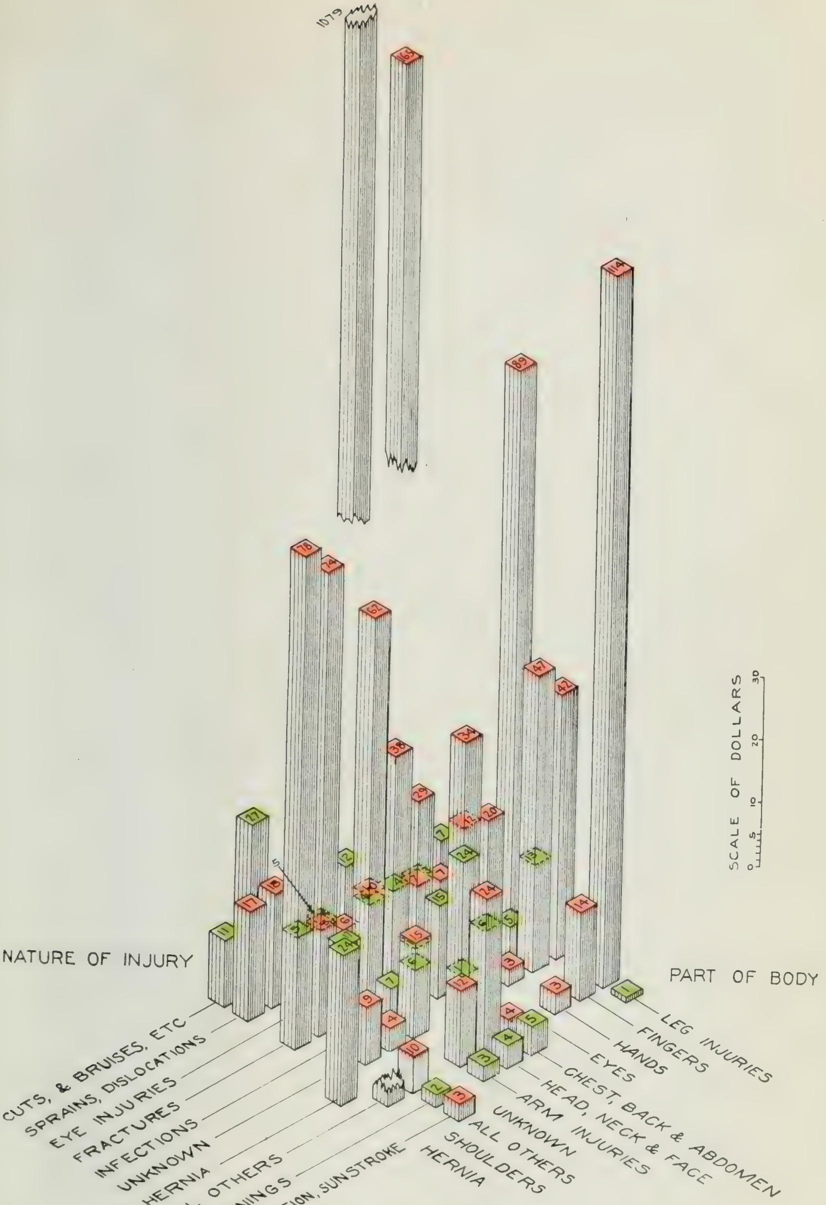
I

HEIGHT OF COLUMN DETERMINED BY NUMBER OF INJURIES



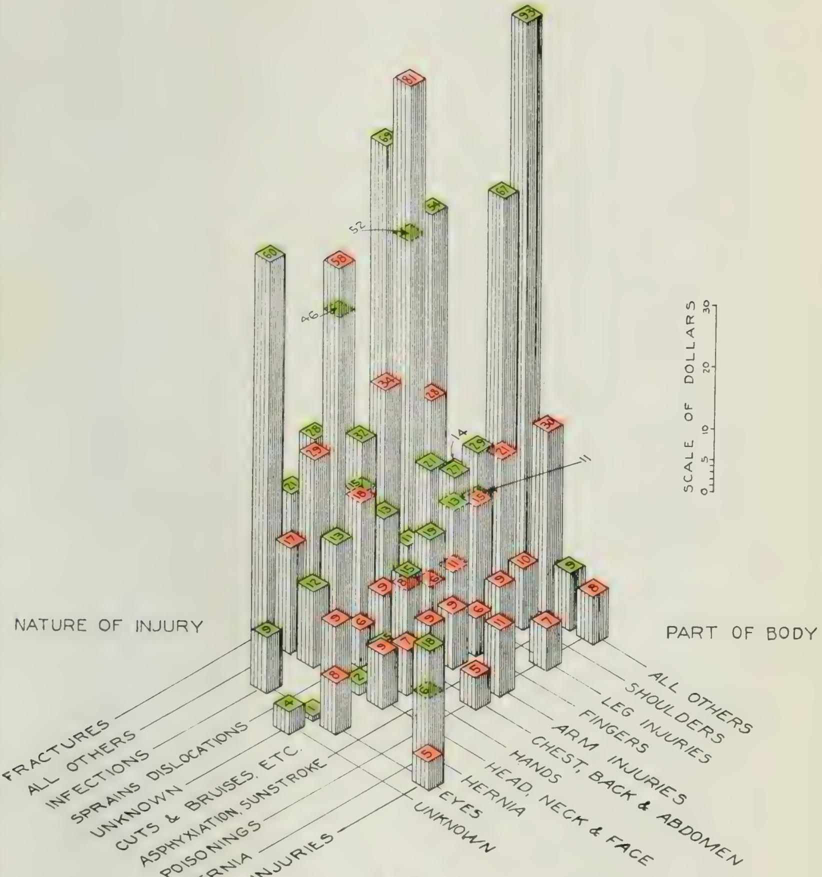
2

HEIGHT OF COLUMN DETERMINED BY TIME LOST IN DAYS



3

HEIGHT OF COLUMN DETERMINED BY COMPENSATION PAYMENTS



4

HEIGHT OF COLUMN DETERMINED BY MEDICAL COSTS

costs for cuts and bruises to fingers, is represented in chart No. 19, subnumbered 3, by the little column marked $3.00, and which is just above the center point in the groups of columns and is between two columns marked "7". The column representing the average medical costs for bruises to fingers is marked $6.00, and stands at the junction of the fourth line under "Part of Body" and the sixth line under "Nature of Injury". It must be noted that the figures on chart No. 17, subnumbered 1, are actual and on charts Nos. 18, 19 and 20, subnumbered 2, 3 and 4, respectively, are averages, and in charts Nos. 19 and 20, subnumbered 3 and 4, refer to dollars, the cents being omitted and not counted in the whole number if less than fifty.

If difficulty is encountered in reading the short columns, table No. 32 will serve as a guide.

What the Repair of All Kinds of Fractures, Eye Injuries and Hernias Costs in Money and Time.

There were 3,845 fractures to bones of the body in 1915 which cost an average of $56.44 in compensation, and $45.64 in medical fees. The average time consumed in recovery was about 42 days (41.74).

In 6,353 eye injuries of a temporary nature, $1.40 was the average compensation payment, and $4.62 for medical service. The time lost averaged about four and one-half days (4.52).

In the 629 hernia cases, the average compensation payment was $23.63, and the medical costs averaged $18.15. Time lost in these cases averaged 22.65 days.

Ages of 65,741 Men Temporarily Injured in 1915, Grouped in Ten-year Periods and Industry Order.

The average age of those temporarily injured in 1915 was 33 years (see age chart in "Study of 533 Fatal Injuries" which compares the age curve for fatal, permanent and temporary injuries in 1914 and 1915). The largest age group is the one composed of those whose ages run from 20 to 29 years and numbers 24,486. Seven employees ranged in age between 80 and 89 years and 4,425 ranged from 10 to 19 years.

TABLE No. 33.

65,741 Temporary Injuries in 1915. Distribution by Industries and Ten-year Age Groups.

Industry	Age groups											
	Unknown	Under 10	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	Totals
Agriculture	331	--------	179	1,025	793	535	271	101	14	--------	--------	3,249
Construction	434	--------	233	2,385	2,502	1,430	556	166	12	--------	--------	7,718
Extraction	213	--------	158	3,210	2,776	1,308	428	85	10	--------	--------	8,188
Manufacturing	569	--------	2,090	8,497	5,817	2,845	1,097	317	36	3	1	21,272
Service	217	--------	203	1,316	887	464	203	67	9	1	--------	3,367
Trades	375	--------	992	2,323	1,452	735	300	97	8	1	--------	6,283
Transportation	441	--------	570	5,730	5,171	2,479	936	298	28	2	--------	15,655
Unknown	9	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	9
Totals	2,589	--------	4,425	24,486	19,398	9,796	3,791	1,131	117	7	1	65,741

Wages of Those Temporarily Injured in 1915 by Industry Groups.

The average wage of those temporarily injured in 1915 was $18. If a comparative wage curve for 1914 and 1915 is desired, see "Study of 533 Fatal Injuries". The largest wage group comprises those whose weekly earnings ranged between $10 and $19 per week.

For those who might care to go into the subject of wages, the temporary injury experience for the two years of 1914 and 1915 was combined and averages drawn from the total of 125,982 injuries. Of this number, 114,842 injured workmen received a wage of from $1 to $26 per week. The remaining 11,140 employees received $27 to $100 per week. The average wage for the 114,842 cases was $14.95 per week and $32.12 per week for the 11,140 cases.

TABLE No. 34.

65,741 Temporary Injuries in 1915. Distribution by Industries and Ten-dollar Wage Groups.

Industry	Wage groups													
	Contract	Unknown	$9	$10 to $19	$20 to $29	$30 to $39	$40 to $49	$50 to $59	$60 to $69	$70 to $79	$80 to $89	$90 to $99	$100 and over	Totals
Agriculture	15	344	490	2,093	240	49	11	5	2					3,249
Construction	8	415	159	4,302	2,093	641	84	12	3		1			7,718
Extraction	3	208	57	4,753	2,653	377	100	26	8	2	1			8,188
Manufacturing	178	602	1,466	13,354	4,828	685	100	40	7	9	3			21,272
Service	18	287	483	1,562	645	223	43	45	19	13	7	7	15	3,367
Trades	6	411	1,072	3,461	1,125	156	28	16	3	1	3	1		6,283
Transportation	15	350	1,126	8,969	4,529	514	108	25	9	5	4	1		15,655
Unknown		9												9
Totals	243	2,626	4,853	38,494	16,113	2,645	474	169	51	30	19	9	15	65,741

Table No. 35 by $2 wage groups follows:

TABLE No. 35.

A Study of 1914 and 1915 Temporary Injuries by Two-dollar Wage Groups.

Wage	Number of cases	Wage	Number of cases	Wage	Number of cases
Contract	119	$27-28	3,516	$65-66	12
Unknown	3,848	29-30	3,082	67-68	9
$1-2	72	31-32	832	69-70	12
3-4	238	33-34	854	71-72	5
5-6	1,716	35-36	1,050	73-74	3
7-8	3,742	37-38	217	75-76	26
9-10	6,399	39-40	517	77-78	6
11-12	13,381	41-42	185	79-80	5
13-14	17,218	43-44	146	81-82	2
15-16	18,939	45-46	144	83-84	5
17-18	17,891	47-48	55	85-86	10
19-20	9,849	49-50	249	87-88	3
21-22	8,812	51-52	13	89-90	3
23-24	7,506	53-54	25	93-94	2
25-26	4,782	55-56	50	95-96	5
		57-58	22	99-100	9
$26 and under	114,842	59-60	43	100	8
		61-62	7		
		63-64	14	$27 to $100 per wk.	11,140

Sex, Nativity and Marital Condition of Those Temporarily Injured in 1914 and 1915.

Chart No. 21 sets forth the three items of sex, nativity and marital condition of those injured in 1914 and 1915 on a comparative basis. As will be noted from the chart, the sections of the circles for each year vary but little in size; the percentage of Americans in 1914 being 64.73 per cent and 64.43 per cent in 1915. The percentage of married men in 1914 was 46.27 per cent against 48.32 per cent for 1915. The lower half of the "Sex" circle shows that no data of this nature was published for 1914. Table No. 36 which follows this chart correlates the items contained in the chart with the additional factor of industry.

TEMPORARY DISABILITY

65741 INJURIES IN 1915
60241 INJURIES IN 1914

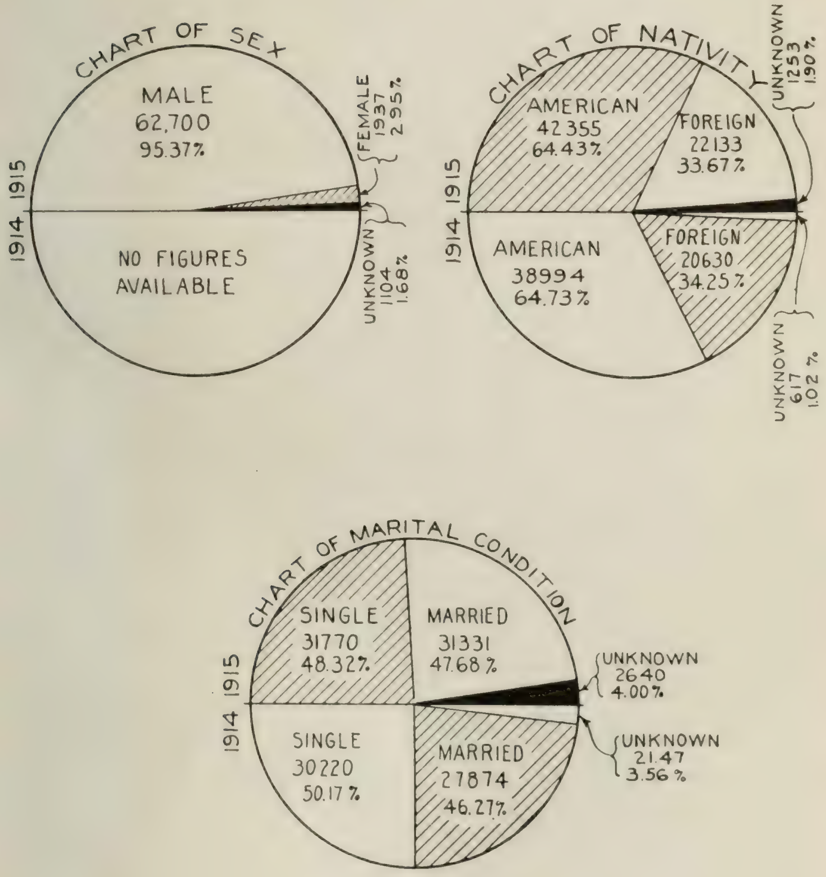


Chart No. 21.

TABLE No. 36.

65,741 Temporary Injuries in 1915. Table Showing Industry by Nativity, Conjugal Condition and Sex.

Industry		Married				Single				Unknown				Totals
		American	Foreign	Unknown	Total	American	Foreign	Unknown	Total	American	Foreign	Unknown	Total	
Agriculture	Male	746	325	--------		1,165	617	1		99	58	2		3,013
	Female	31	4	--------		19	5	--------		1	1	--------		61
	Unknown	--------	--------	--------		--------	--------	--------		--------	--------	175		175
	Totals	777	329	--------	1,106	1,184	622	1	1,807	100	59	177	336	3,249
Construction	Male	2,657	1,068	3		2,196	1,297	10		171	92	4		7,498
	Female	5	1	--------		3	--------	--------		--------	--------	--------		9
	Unknown	--------	--------	--------		--------	--------	--------		--------	--------	211		211
	Totals	2,662	1,069	3	3,734	2,199	1,297	10	3,506	171	92	215	478	7,718
Extraction	Male	2,283	1,472	2		2,113	2,077	--------		77	52	2		8,078
	Female	3	2	--------		1	1	--------		1	--------	--------		8
	Unknown	--------	--------	--------		--------	--------	--------		--------	--------	102		102
	Totals	2,286	1,474	2	3,762	2,114	2,078	--------	4,192	78	52	104	234	8,188
Manufacturing	Male	6,389	3,412	9		6,367	3,853	17		288	147	8		20,490
	Female	133	82	--------		264	72	2		4	2	8		567
	Unknown	1	1	--------		3	1	--------		--------	--------	209		215
	Totals	6,523	3,495	9	10,027	6,634	3,926	19	10,579	292	149	225	666	21,272
Service	Male	977	311	8		978	419	7		87	31	5		2,823
	Female	141	53	2		208	55	2		10	4	--------		475
	Unknown	1	--------	--------		1	--------	--------		--------	--------	67		69
	Totals	1,119	364	10	1,493	1,187	474	9	1,670	97	35	72	204	3,367

Trades	Male	1,804	598	19		2,120	657	21		113	68	10		5,410
	Female	219	22	5		390	68	4		8	3	1		720
	Unknown	2	--------	--------		--------	--------	--------		1	--------	150		153
	Totals	2,025	620	24	2,669	2,510	725	25	3,260	122	71	161	354	6,283
Transportation	Male	5,975	2,531	1		4,089	2,599	6		124	54	1		15,380
	Female	25	8	--------		54	8	--------		1	--------	--------		96
	Unknown	--------	--------	--------		--------	--------	--------		--------	--------	179		179
	Totals	6,000	2,539	1	8,540	4,143	2,607	6	6,756	125	54	180	359	15,655
Unknown	Male	--------	--------	--------		--------	--------	--------		6	2	--------		8
	Female	--------	--------	--------		--------	--------	--------		1	--------	--------		1
	Totals	--------	--------	--------		--------	--------	--------		7	2	--------	9	9
Totals		21,392	9,890	49	31,331	19,971	11,729	70	31,770	992	514	1,134	2,640	65,741

Temporary Injuries Tabulated by the Day of the Week, Month of the Year and by the Day of the Month in Which They Occurred.

Chart No. 22 and tables numbered 37 and 38, set forth the items of injury incidence by (1) the day of the week, (2) month of the year, and (3) day of the month. The chart is a generalization of the tables which go more into the details of the industries in which the injuries occurred. The chief value of these figures is statistical, and if for no other reason, they should be preserved in record form. The experience is compared on the chart and is on a percentage basis. The solid line is for 1914 and the hatched for 1915.

TABLE No. 37.

65,741 Temporary Injuries in 1915. Table Showing Industry by Day of Week.

Industry	Unknown	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Totals
Agriculture	190	204	457	471	487	529	462	449	3,249
Construction	221	363	1,230	1,217	1,143	1,147	1,286	1,111	7,718
Extraction	116	684	1,223	1,270	1,229	1,247	1,242	1,177	8,188
Manufacturing	273	759	3,494	3,427	3,436	3,285	3,431	3,167	21,272
Service	74	261	507	518	560	471	483	493	3,367
Trades	180	228	994	968	957	955	1,007	994	6,283
Transportation	222	962	2,418	2,442	2,537	2,368	2,455	2,251	15,655
Unknown	-------	1	1	2	-------	2	-------	3	9
Totals	1,276	3,462	10,324	10,315	10,349	10,004	10,366	9,645	65,741

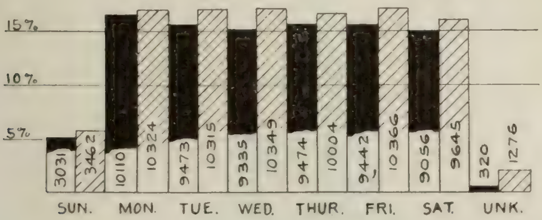
FREQUENCY OF INJURIES CAUSING TEMPORARY DISABILITY

TOTAL NUMBER FOR 1914 - 60,241, FOR 1915 - 65,741

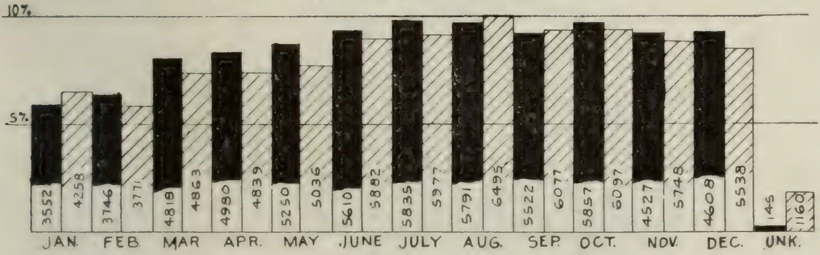
1915 shown thus ▨ 1914 shown thus ■

NOTE - Each years figures form the basis of percentage for that year

BY DAY OF WEEK



BY MONTH OF YEAR



BY DAYS OF MONTH

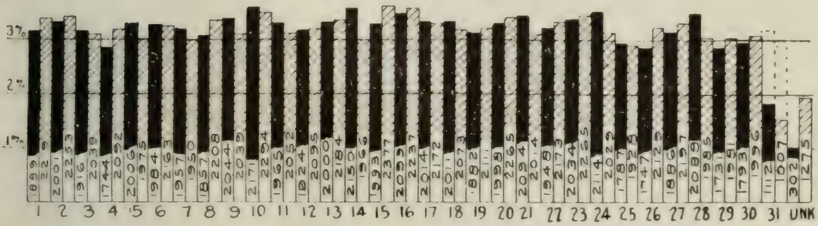
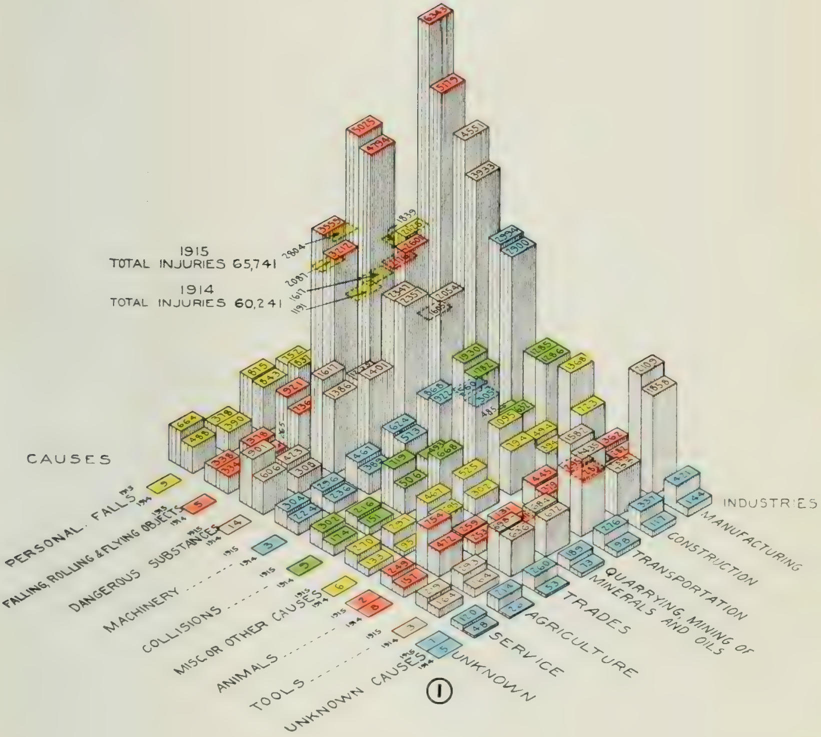


Chart No. 22.

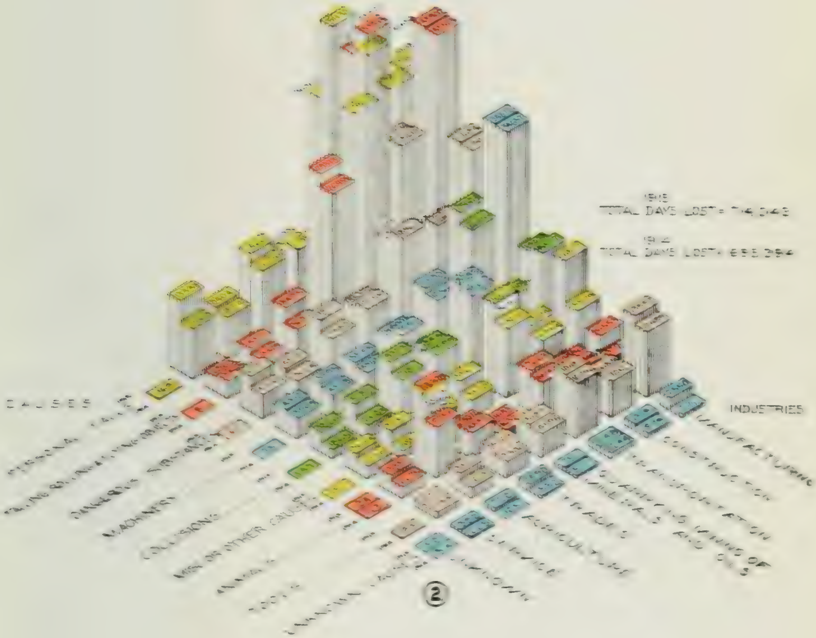
TABLE No. 38.

65,741 Temporary Injuries in 1915. Table Showing Industry by Month of Year.

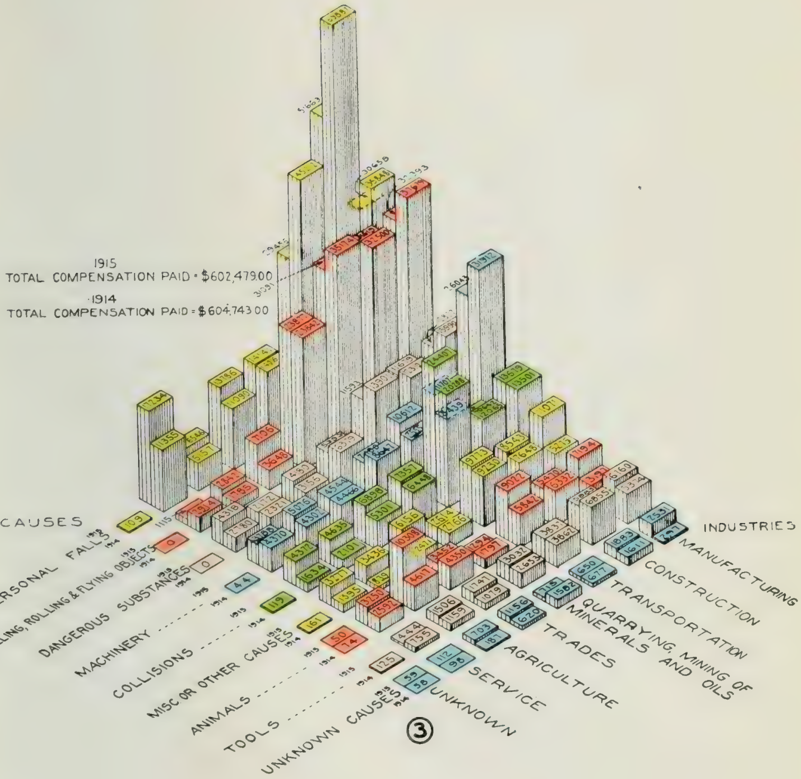
Industries	January	February	March	April	May	June	July	August	September	October	November	December	Unknown	Total
Agriculture	186	121	200	221	200	328	349	404	311	288	233	234	174	3,249
Construction	614	470	633	572	537	776	644	734	646	688	612	577	215	7,718
Extraction	537	491	694	667	653	755	769	746	751	656	676	680	113	8,188
Manufacturing	1,249	1,132	1,436	1,576	1,694	1,896	1,977	2,261	2,172	2,145	1,831	1,667	236	21,272
Service	248	215	241	226	241	269	305	326	297	316	307	305	71	3,367
Trades	383	378	457	446	445	497	513	565	518	588	667	667	159	6,283
Transportation	1,041	964	1,202	1,130	1,266	1,361	1,420	1,458	1,379	1,415	1,422	1,406	191	15,655
Unknown	--------	--------	--------	1	--------	--------	--------	1	3	1	--------	2	1	9
Totals	4,258	3,771	4,863	4,839	5,036	5,882	5,977	6,495	6,077	6,097	5,748	5,538	1,160	65,741


1915
TOTAL INJURIES 65,741
1914
TOTAL INJURIES 60,241
CAUSES
PERSONAL FALLS
FALLING, ROLLING & FLYING OBJECTS
DANGEROUS SUBSTANCES
MACHINERY
COLLISIONS
MISC OR OTHER CAUSES
ANIMALS
TOOLS
UNKNOWN CAUSES
1915
1914
INDUSTRIES
MANUFACTURING
CONSTRUCTION
TRANSPORTATION
QUARRYING, MINING OF MINERALS AND OILS
TRADES
AGRICULTURE
SERVICE
UNKNOWN

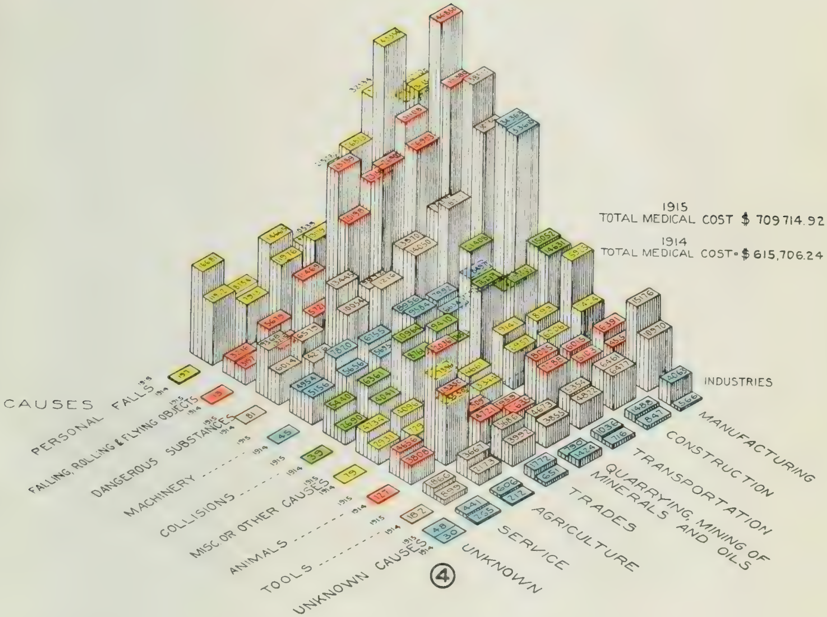
①


1913
TOTAL DAYS LOST = 714,043
1914
TOTAL DAYS LOST = 695,394
CAUSES
PERSONAL FALLS
FALLING OR MOVING OBJECTS
DANGEROUS SUBSTANCES
MACHINERY
COLLISIONS
MISC. OR OTHER CAUSES
ANIMALS
TOOLS
UNKNOWN
INDUSTRIES
MANUFACTURING
CONSTRUCTION
TRANSPORTATION
QUARRYING MINING OF METALS AND OILS
TRADES
AGRICULTURE
SERVICE
UNKNOWN

②


1915
TOTAL COMPENSATION PAID = $602,479.00
1914
TOTAL COMPENSATION PAID = $604,743.00
CAUSES
PERSONAL FALLS
FALLING, ROLLING & FLYING OBJECTS
DANGEROUS SUBSTANCES
MACHINERY
COLLISIONS
MISC OR OTHER CAUSES
ANIMALS
TOOLS
UNKNOWN CAUSES
1915
1914
INDUSTRIES
MANUFACTURING
CONSTRUCTION
TRANSPORTATION
QUARRYING, MINING OF MINERALS AND OILS
TRADES
AGRICULTURE
SERVICE
UNKNOWN
109
0
0
44
119
161
50
74
125
59
58
112
98
703
187
1156
620
715
1562
650
677
1883
1611
2531
297
51663
45221
30658
35848
32393
29455
31091
35174
32500
31912
26043
12387
13842
11593
11390
24407
20208
10612
13519
13501
10711
12234
11355
6546
5157
13186
11090
7106
3648
2842
1785
2914
1115
4318
2780
2172
2321
4480
3156
5076
4302
4544
4466
6898
5301
7357
6448
9773
9230
8543
7648
5215
7194
9022
5842
5470
6332
6160
6855
3837
3862
3032
2653
1741
1079
1506
1159
444
755
4635
2101
4372
1634
3436
3277
1395
6156
2614
2766
10308
2471
4617
3452
4350
11294
1797
3250
2592

③



1915
TOTAL MEDICAL COST $ 709714.92

1914
TOTAL MEDICAL COST $ 615,706.24

④

A Study of the Chief Causes, Industries, Compensation, Medical Costs and Time Lost in 65,741 Temporary Injury Cases in 1915.

The injuries are classed under seven large industry groups: (1) Agriculture and its neighboring pursuits; (2) construction; (3) quarrying, mining of minerals and oils; (4) manufacturing; (5) all businesses which do not produce, construct or manufacture commodities, but which render a service only and conveniently called "Service"; (6) the mercantile trades; (7) steam and water transportation enterprises and public utilities.

The payments of compensation and for medical services are given for each main cause under each large industry group and the main industry groups are subdivided into many smaller groups which represent some specialized phase of the industry. The chief causes are subdivided and studied but not in connection with the subindustries which would be very desirable, but very tedious. Instead of this, several charts have been made to correlate and compare the salient points in each main industry and cause groups by the costs and time loss for the two years of 1914 and 1915.

In charting the data for industries, two sets were made, a three-dimension set of four charts, and a set of seven-line charts. The four three-dimension charts are to be read in combination with each of the seven-line charts and are independent units and require no further explanation than that each main cause under each industry has four lines—two for 1914 and two for 1915 data. The blank line split once represents the injury experience for the two years and the part solid and the part blank line represents the compensation and medical costs for each of the two years.

Coming to the four "three-dimension" or "3-way" charts, numbered 23, 24, 25 and 26, although the data is on a 1914–1915 comparative basis, the four charts must be read in connection with each other, and in their order, subnumbers 1, 2, 3 and 4.

The height of the column in No. 23, subnumbered 1, is determined by the number of injuries due to each cause in each industry—in No. 24, subnumbered 2, the height is determined by the time lost in days in any given class of injuries due to any given cause and industry. The heights of the columns in No. 25, subnumbered 3, and No. 26, subnumbered 4, are determined by the costs in compensation and medical fees, respectively.

The position or order of the industries and causes remains unchanged in all the four charts, and therefore, facilitates the reading of the results of any group of injuries due to any cause in any of the industries. For example, chart No. 23, subnumbered 1, shows 472 "animal injuries" in agriculture in 1914 against 754 in 1915, and chart No. 24, subnumbered 2, shows a time loss of 9,754 days due to the 472 injuries in 1914 against 15,403 days lost due to the 754 injuries in 1915. Chart No. 25, subnumbered 3, indicates a loss of $4,617 in compensation paid for the 1914 injuries and $10,308 for the 1915 cases, and chart No. 26, subnumbered 4, shows the physicians received $13,350 for their services in 1914 against $20,367 in 1915. The totals for both years for all items appear on the four charts.

3,249 TEMPORARY INJURIES OCCURRING IN AGRICULTURE.

Grouped by Subindustry.

Time: 12 Months—January 1 to December 31, 1915.

Agriculture.

General farming (no blasting), horticulture, viticulture, hop culture and conservative forestry	2,189
Dairy farming	197
Power farming (machinery, power driven, no blasting)	21
Stock farming (poultry ranches)	420
Garden or truck farming—floriculture, nurseries and landscape gardening	45
Operating farm machinery—not by farmer—all sorts of threshing, hay baling, etc., where work is sublet	79
Picking, packing, drying and curing of fruits	252
Farm work where explosives are used	7
Fumigating and spraying fruits	39
Total	3,249

NOTE.—Irrigation plants operated by regular farm laborers fall under the head of "General Farming". All reclamation and irrigation projects operated by a class of labor which never engages in farm work, but follows the construction camp from one district to another, fall under the classification of "Construction".

3,249 TEMPORARY INJURIES OCCURRING IN AGRICULTURE.

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

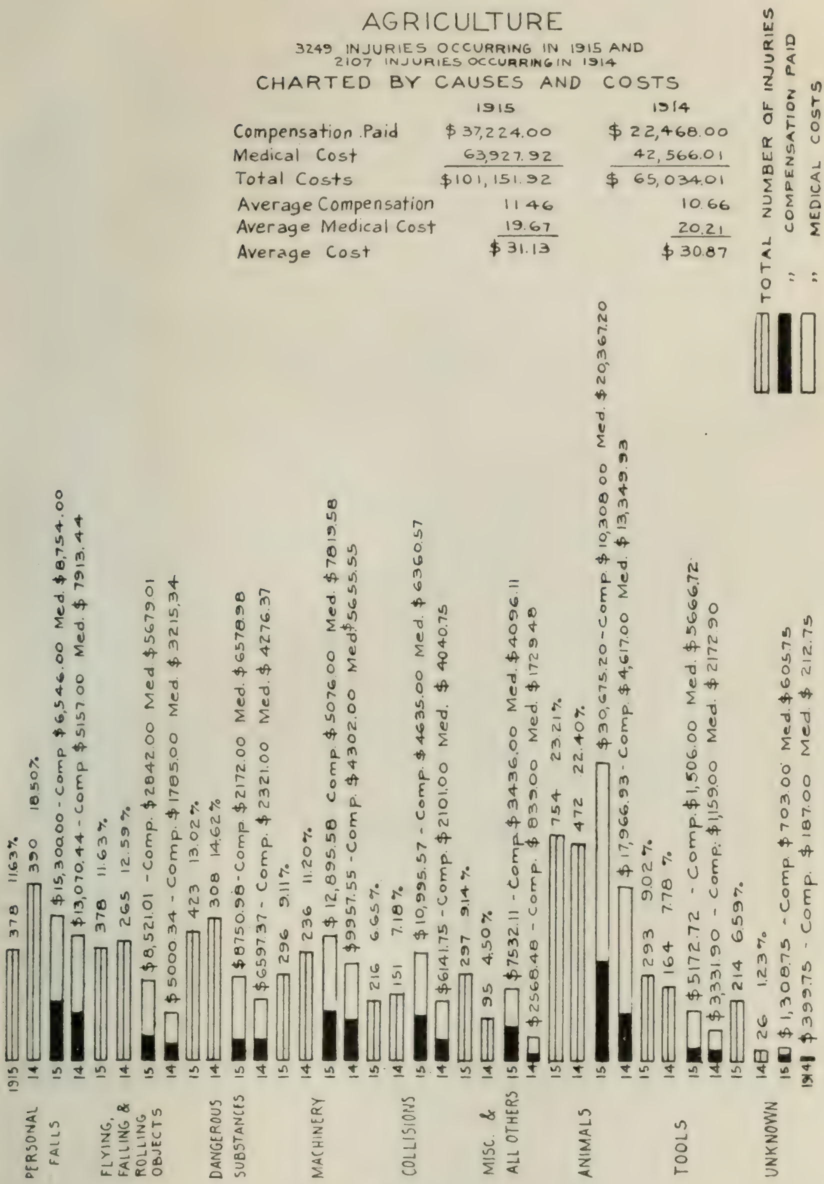
Machinery	296
Dangerous substances	423
Falling, rolling or flying objects	242
Personal falls	378
General, or all other causes	1,696
Unknown	214
Totals	3,249

3,249 TEMPORARY INJURIES OCCURRING IN AGRICULTURE.

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

Machinery	5,395
Dangerous substances	4,578
Falling, rolling and flying objects	2,632
Personal falls	8,404
General or all other causes	29,936
Unknown	720
Total	51,665



AGRICULTURE

3249 INJURIES OCCURRING IN 1915 AND
2107 INJURIES OCCURRING IN 1914
CHARTED BY CAUSES AND COSTS

	1915	1914
Compensation Paid	$ 37,224.00	$ 22,468.00
Medical Cost	63,927.92	42,566.01
Total Costs	$101,151.92	$ 65,034.01
Average Compensation	11.46	10.66
Average Medical Cost	19.67	20.21
Average Cost	$ 31.13	$ 30.87

Chart No. 27.

3,249 TEMPORARY INJURIES OCCURRING IN AGRICULTURE.

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$5,076 00	$7,819 58	$12,895 58
Dangerous substances	2,172 00	6,578 98	8,750 98
Falling, rolling and flying objects	1,982 00	3,391 38	5,373 38
Personal falls	6,546 00	8,754 00	15,300 00
General or all other causes	20,745 00	36,778 23	57,523 23
Unknown	703 00	605 75	1,308 75
Totals	$37,224 00	$63,927 92	$101,151 92

A STUDY OF 3,249 TEMPORARY INJURIES OCCURRING IN THE AGRICULTURAL INDUSTRY.

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

296 Temporary Injuries Due to Machinery.

Air hammers and riveters and all compressed air engines and devices, 2. Backfires of motors and engines when cranking or starting, 42. Slipping, breaking, etc., of power transmitting belts (main), 19. Slipping, breaking, etc., of power transmitting belts (secondary), 6. Chain transmission, 5. Drills, dies, punches, metal stamps and presses, 6. All platform elevators, including skips and buckets, 6. Electric fans and motors, etc., 4. Explosion of steam containers, 2. Feed rolls of all classes, including mangles and body ironers in laundries, 2. Gas engines or internal combustion motors, 10. Gears and cogs, 21. All hoisting apparatus, other than platform elevators, 28. Power driven saws, either band or circular, 14. Set screws, 8. Shafting and conveyors, 13. Shears, cutters, grinders, etc., used in the preparation of foodstuffs, 5. Shears and cutters used in the working of metals and the manufacturing of paper, textiles, etc., 3. Steam engines, 17. Treadmills and windlasses, 6. Lathes, 1. Machinery without mechanical power such as jacks, levers, etc., 17. All injuries not otherwise classified, caused by machinery peculiar to the agricultural industry, 58. All other machines, 1.

423 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 6. Powder, 2. Dynamite, 1. Explosion and combustion of gases, 7. Explosion and combustion of petroleum, 2. Explosion and combustion of benzine, 6. Flames from ovens, oil burners, furnaces, etc., 9. Other fires, unprotected blazes, etc., 4. Hot metals, slags, ashes, etc., and other hot materials, 4. Steam, hot water and other hot liquids, 26. Caustics, alkalies, acids, quicklime, etc., 21. Inhaling of poisonous gases, 6. Splinters, slivers, glass, nails and other sharp objects, 317. All other materials, poisonous or inherently dangerous, 12.

242 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stones, sand and earth, including cave-ins, etc., 9. Falling buildings, walls, and similar structures, 2. Falling scaffolds and stagings due to being improperly constructed or supported, 2. Falling piles of material, such as lumber, etc., 16. All flying objects, including flying particles of steel, emery, etc., 143. All other classes of falling and rolling objects not included in the above classes, 70.

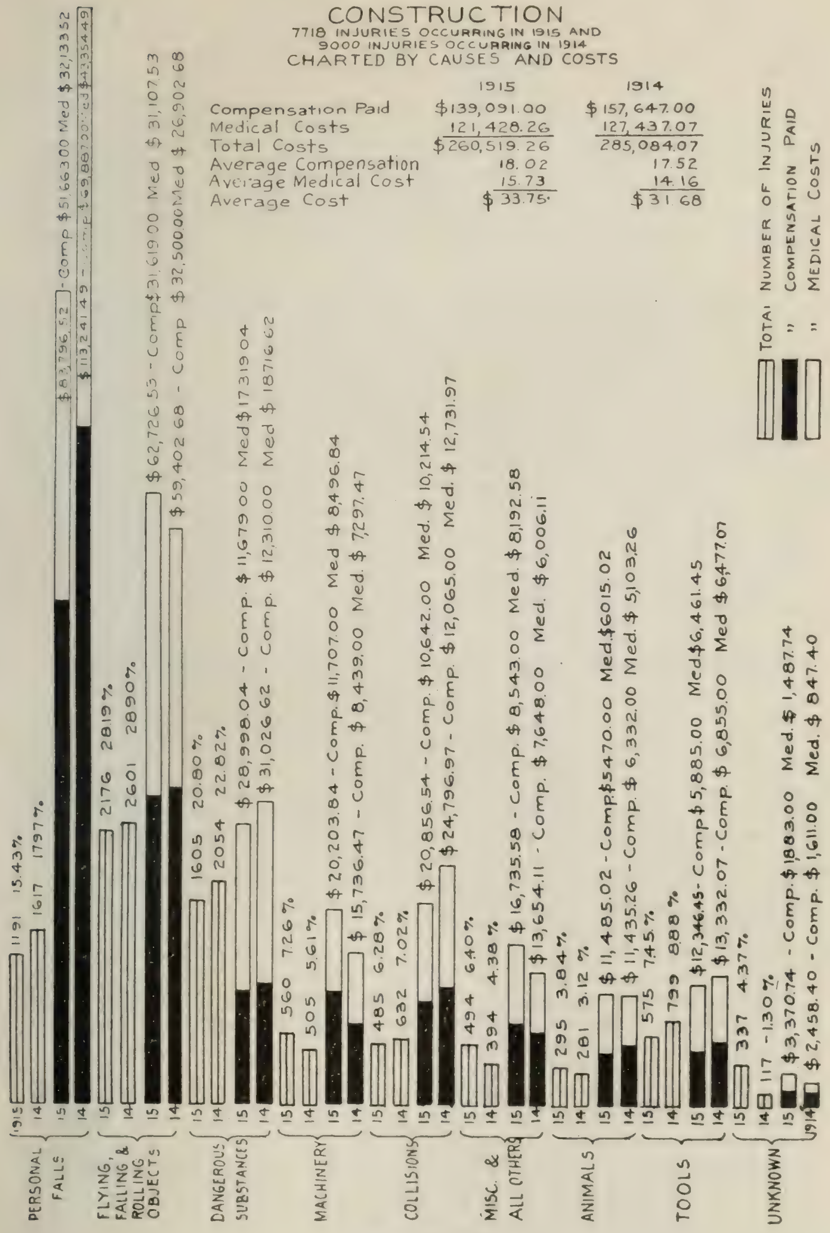

CONSTRUCTION
7718 INJURIES OCCURRING IN 1915 AND
9000 INJURIES OCCURRING IN 1914
CHARTED BY CAUSES AND COSTS
1915
1914
Compensation Paid $139,091.00 $157,647.00
Medical Costs 121,428.26 127,437.07
Total Costs $260,519.26 285,084.07
Average Compensation 18.02 17.52
Average Medical Cost 15.73 14.16
Average Cost $33.75 $31.68
TOTAL NUMBER OF INJURIES
" COMPENSATION PAID
" MEDICAL COSTS
PERSONAL FALLS
1915 1191 15.43%
14 1617 17.97%
15 $83,796.52 - Comp $51,663.00 Med $32,133.52
14 $113,241.49 - Comp $69,887.00 Med $43,354.49
FLYING, FALLING & ROLLING OBJECTS
15 2176 28.19%
14 2601 28.90%
15 $62,726.53 - Comp $31,619.00 Med $31,107.53
14 $59,402.68 - Comp $32,500.00 Med $26,902.68
DANGEROUS SUBSTANCES
15 1605 20.80%
14 2054 22.82%
15 $28,998.04 - Comp. $11,679.00 Med $17,319.04
14 $31,026.62 - Comp. $12,310.00 Med $18,716.62
MACHINERY
15 560 7.26%
14 505 5.61%
15 $20,203.84 - Comp. $11,707.00 Med $8,496.84
14 $15,736.47 - Comp. $8,439.00 Med. $7,297.47
COLLISIONS
15 485 6.28%
14 632 7.02%
15 $20,856.54 - Comp. $10,642.00 Med. $10,214.54
14 $24,796.97 - Comp. $12,065.00 Med. $12,731.97
MISC. & ALL OTHERS
15 494 6.40%
14 394 4.38%
15 $16,735.58 - Comp. $8,543.00 Med. $8,192.58
14 $13,654.11 - Comp. $7,648.00 Med. $6,006.11
ANIMALS
15 295 3.84%
14 281 3.12%
15 $11,485.02 - Comp $5470.00 Med $6015.02
14 $11,435.26 - Comp. $6,332.00 Med. $5,103.26
TOOLS
15 575 7.45%
14 799 8.88%
15 $12,346.45 - Comp $5,885.00 Med $6,461.45
14 $13,332.07 - Comp. $6,855.00 Med $6,477.07
UNKNOWN
15 337 4.37%
14 117 - 1.30%
15 $3,370.74 - Comp. $1,883.00 Med. $1,487.74
1914 $2,458.40 - Comp. $1,611.00 Med. $847.40

Chart No. 28.

378 Temporary Injuries Due to Personal Falls.

Falls from ladders due to loss of balance or due to ladder slipping, breaking or collapsing, 55. Falls on or from stairs due to loss of balance or slipping or due to defects in construction of stairs, etc., 11. Falls from scaffolds due to slipping or loss of balance or due to improper construction of same, 7. Falls from buildings in course of construction, 4. All falls from windows, including those where proper safeguards are not provided or where injured neglects to use same, 1. Falls from roofs due to slipping or losing balance or lack of proper guards, 4. All other falls from elevations which can not conveniently be grouped under the above classifications, 147. Falls into excavations due to slipping or losing balance, etc., 4. Falls into wells, 1. Falls into all other unprotected openings, 6. Slipping or falling on even ground or ordinary surfaces, 65. All other falls not otherwise classified, 73.

1,696 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in discharge of duties, 4. All injuries due to animal agency, including kicks, bites, etc., 478. Carriage accidents, including all animal-drawn vehicles, 252. All injuries due to revolvers and guns, 6. Hand tools and hand machinery, such as hammers, knives, axes, etc., 293. All intoxication cases, 10. All motor-driven vehicle accidents, 29. Occupational diseases, including infections and disorders arising from working conditions, 107. Railroad and street car accidents, 5. Riding accidents, either being thrown or falling from horses or bicycles, 112. Running into or striking stationary objects, protruding or otherwise, 51. All shipping and navigation accidents, 3. Transporting or handling heavy weights, 156. Objects slipping or falling while handling or working with same, 85. Swinging or rebounding objects that are attached to foundations, 50. All other cases not included in above classes, 55.

Injuries where the causes are unknown, 214.

7.718 TEMPORARY INJURIES OCCURRING IN CONSTRUCTION.

Grouped by Subindustry.

Time: 12 Months—January 1 to December 31, 1915.

Construction.

Clearing, wrecking, moving, etc.	91
All kinds of grading, excavating and foundation work, excluding highway and railway work	536
Highway, city, county and state railroadbed making, trenching and tunneling, excluding such work of this nature as is done by the regular "way maintenance" crews of railroad companies	1,256
Reclamation of marsh and arid lands, river dredging, harbor dredging and pile driving, but excluding dredging for precious metals	507
All forms of general construction. This includes all forms of superstructure work of wood, brick, stone and concrete, excepting all structural steel work, bridge work, steeplejack and stack painting	3,638
Structural steel, bridge work, steeple and stack work	314
All work of finishing and equipping of structures, etc., such as plastering, painting, plumbing, decorating, electric wiring, tile and marble work, installing of boilers, furnaces and machinery	1,038
Shipbuilding	270
Surveyors, mining engineers, civil engineers, etc.	15
Bill posting and sign painting	38
Wrecking and salvaging ships	5
Unknown	10
Total	7,718

7,718 TEMPORARY INJURIES OCCURRING IN CONSTRUCTION.

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

Machinery	560
Dangerous substances	1,605
Falling, rolling or flying objects	1,315
Personal falls	1,191
General or all other causes	2,710
Unknown	337
Total	7,718

7,718 TEMPORARY INJURIES OCCURRING IN CONSTRUCTION.

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

Machinery	8,293
Dangerous substances	14,192
Falling, rolling and flying objects	16,390
Personal falls	29,412
General or all other causes	40,201
Unknown	1,319
Total	109,807

7,718 TEMPORARY INJURIES OCCURRING IN CONSTRUCTION.

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$11,707 00	$8,496 84	$20,203 84
Dangerous substances	11,679 00	17,319 04	28,998 04
Falling, rolling and flying objects	20,878 00	20,086 99	40,964 99
Personal falls	51,663 00	32,133 52	83,796 52
General or all other causes	41,281 00	41,904 13	83,185 13
Unknown	1,883 00	1,487 74	3,370 74
Totals	$139,091 00	$121,428 26	$260,519 26

A STUDY OF 7,718 TEMPORARY INJURIES OCCURRING IN CONSTRUCTION.

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

560 Temporary Injuries Due to Machinery.

Air hammers and riveters and all compressed air engines and devices, 22. Backfires of motors and engines when cranking or starting, 62. Slipping, breaking, etc., of power transmitting belts (main), 18. Slipping, breaking, etc., of power transmitting belts (secondary), 9. Chain transmission, 8. Drills, dies, punches, metal stamps and presses, 15. All platform elevators, including skips and buckets, 33. Electric fans, motors, etc., 3. Emery wheel accidents, 8. Feed rolls of all classes, including mangles and body ironers in laundries, 2. Friction wheels, 1. Gas engines or internal combustion motors, 13. Gears and cogs, 32. All hoisting apparatus, other than platform elevators, 105. Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers, 16. Pile-drivers and bull-dozers, 13. Power-driven saws, either band or circular, 58. Set screws, 1. Shafting and conveyors, 9. Shears and cutters used in the working of metals, 2. Steam engines, 23. Treadmills and windlasses, 7. Lathes, 2. Machinery without mechanical power, such as jacks, levers, etc., 31. All injuries not otherwise classified, caused by machinery peculiar to the industry of construction, 59. All other machines, 8.

1.605 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 11. Powder, 11. Dynamite, 33. Explosion and combustion of gases, 12. Explosion and combustion of petroleum, 4. Explosion and combustion of benzine, 20. Flames from ovens, oil burners, furnaces, etc., 15. Other fires, unprotected blazes, etc., 24. Hot metals, slags, ashes, etc., and other hot materials, 43. Steam, hot water and other hot liquids, 81. Caustics, alkalies, acids, quicklime, etc., 115. Inhaling of poisonous gases, 2. Splinters, slivers, glass, nails and other sharp objects, 1,191. All other materials, poisonous or inherently dangerous, 43.

1.315 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stone, sand and earth, including cave-ins, etc., 236. Falling buildings, walls and similar structures, 12. Falling scaffolds and stagings due to being improperly constructed or supported, 31. Falling piles of material, such as lumber, etc., 44. All flying objects, including flying particles of steel, emery, etc., 536. All other classes of falling and rolling objects not included in the above classes, 456.

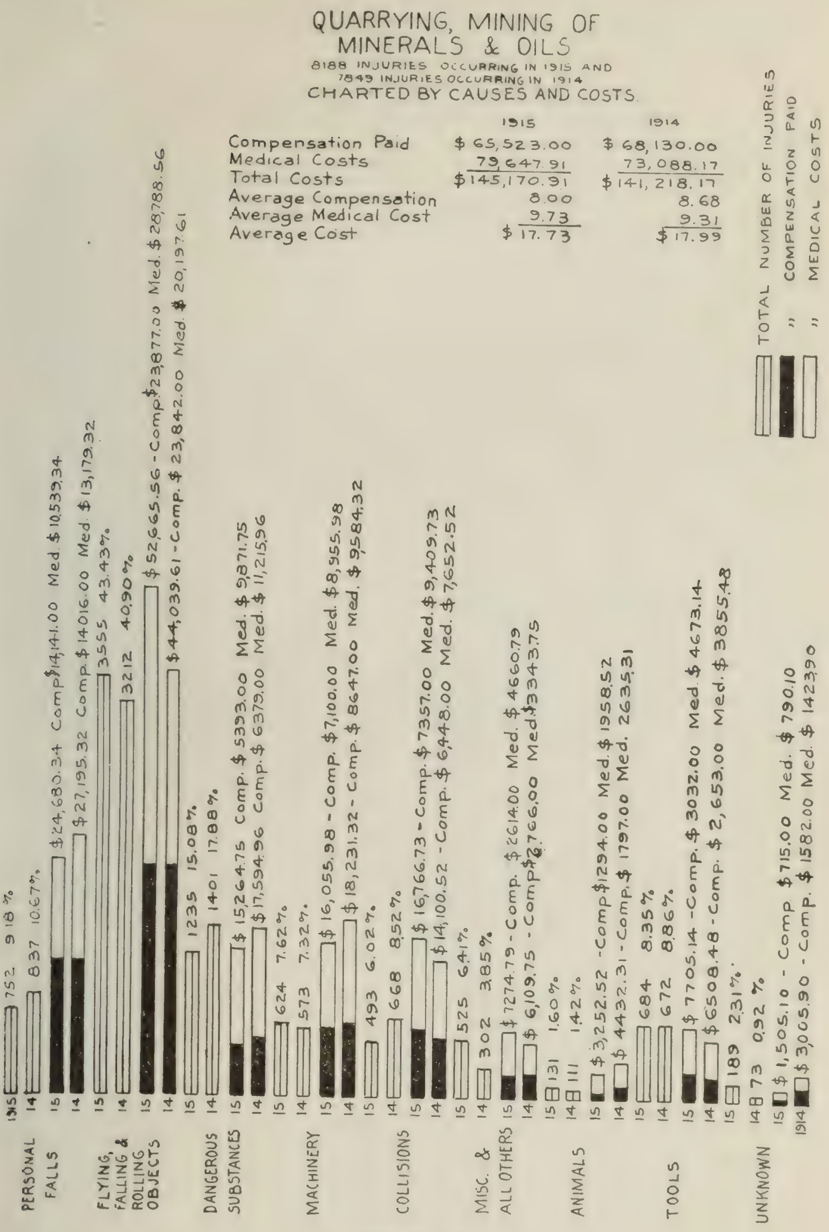
1,191 Temporary Injuries Due to Personal Falls.

Falls from ladders, due to loss of balance or due to ladder slipping, breaking or collapsing, 137. Falls on or from stairs, due to loss of balance or slipping or due to defects in construction of stairs, etc., 18. Falls from scaffolds due to slipping or loss of balance or due to improper construction of same, 222. Falls from buildings in course of construction, 67. All falls from windows, including those where proper safeguards are not provided or where injured neglects to use same, 4. Falls from roofs, due to slipping or losing balance or lack of proper guards, 30. All other falls from elevations which can not conveniently be grouped under the above classifications, 209. Falls into shafts, due to slipping or falling or due to shaft being improperly protected, 3. Falls into excavations, due to slipping or losing balance, etc., 28. Falls into cellars, 4. Falls into all other unprotected openings, 36. Slipping or falling on even ground or ordinary surfaces, 162. All other falls not otherwise classified, 271.

2.710 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in discharge of duties, 7. All injuries due to animal agency, including kicks, bites, etc., 209. Carriage accidents, including all animal-drawn vehicles, 129. All injuries due to revolvers and guns, 3. Hand tools and hand machinery, such as hammers, knives, axes, etc., 664. All intoxication cases, 7. All motor-driven vehicle accidents, 92. Occupational diseases, including infections and disorders arising from working conditions, 40. Railroad and street car accidents, 28. Riding accidents, either being thrown or falling from horses or bicycles, 13. Running into or striking stationary objects, protruding or otherwise, 188. All shipping and navigation accidents, 2. Transporting or handling heavy weights, 401. Objects slipping or falling while handling or working with same, 638. Swinging or rebounding objects that are attached to foundations, 142. All other cases, not included in above classes, 147.

Injuries where the causes are unknown, 337.



	1915	1914
Compensation Paid	$ 65,523.00	$ 68,130.00
Medical Costs	79,647.91	73,088.17
Total Costs	$145,170.91	$ 141,218.17
Average Compensation	8.00	8.68
Average Medical Cost	9.73	9.31
Average Cost	$ 17.73	$ 17.99

Chart No. 29.

8,188 TEMPORARY INJURIES OCCURRING IN THE EXTRACTION OF RAW MATERIALS FROM EARTH (MINES, QUARRIES AND OIL FIELDS).

Grouped by Subindustry.

Time: 12 Months—January 1 to December 31, 1915.

Extraction of Raw Materials From Earth (Mines, Quarries and Oil Fields).

Underground mining of—	
Gold and silver	3,046
Copper	508
Lead and zinc	3
Quicksilver	114
Iron (pyrites, etc.)	7
Magnesite and tungsten	43
Coal	9
Gypsum	1
Asbestos	4
Surface Mining—	
Placer mining of all metals	2
All hydraulic mining	10
Dredging for minerals only	403
Borax and salt	53
All metallurgical plants, including small smelters and refiners at or near the mines	8
Quarrying of—	
Building stone	89
Cement lime and rock	561
Sand, gravel and rock	336
Clay	18
Stone crushing, mortar mixing and preparation of roadbed materials (also, see Manufacturing)	81
Oil production in all its branches, except refining of lubricating oil, etc.	2,891
Unknown	1
Total	8,188

8,188 TEMPORARY INJURIES OCCURRING IN THE EXTRACTION OF RAW MATERIALS FROM EARTH (MINES, QUARRIES AND OIL FIELDS).

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

Machinery	624
Dangerous substances	1,235
Falling, rolling and flying objects	2,639
Personal falls	758
General or all other causes	2,743
Unknown	189
Total	8,188

8,188 TEMPORARY INJURIES OCCURRING IN THE EXTRACTION OF RAW MATERIALS FROM EARTH (MINES, QUARRIES AND OIL FIELDS).

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

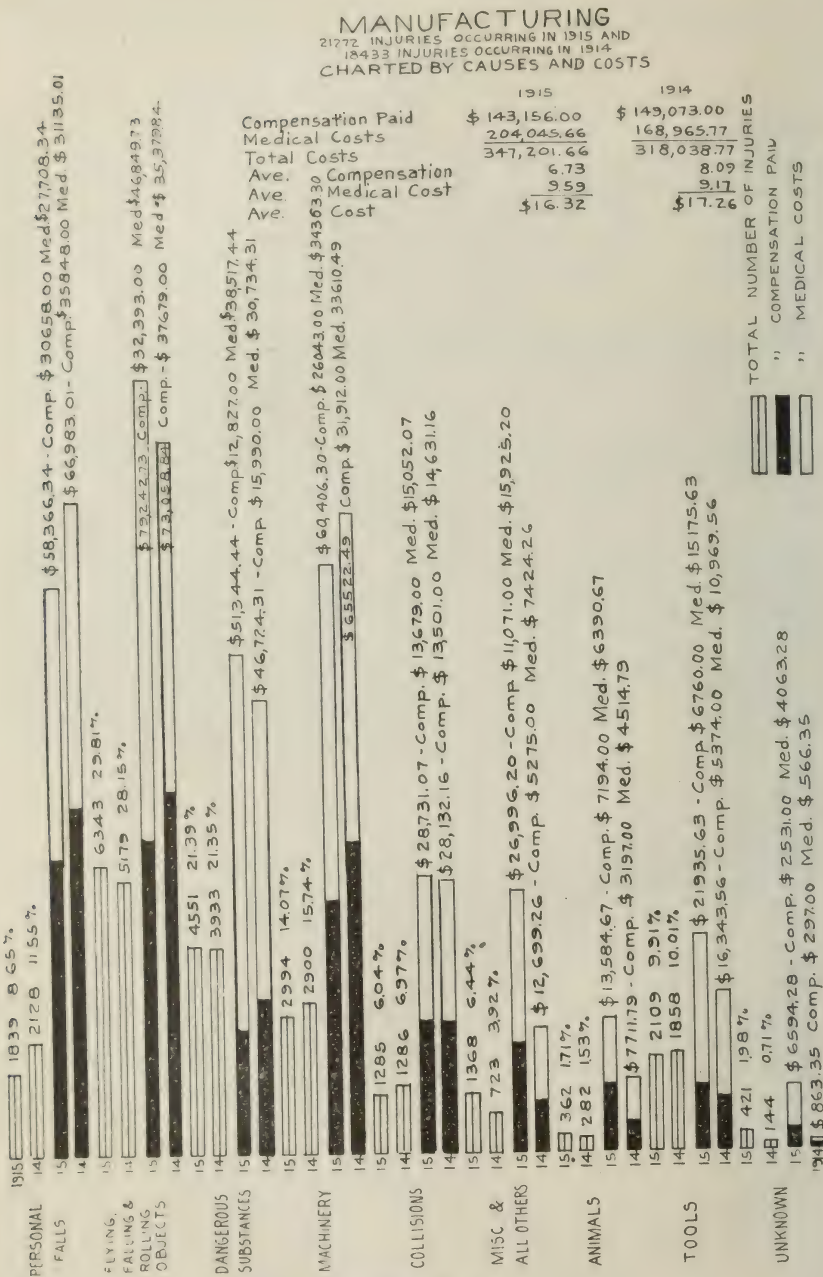
Machinery	6,600
Dangerous substances	8,535
Falling, rolling and flying objects	20,859
Personal falls	11,289
General or all other causes	28,212
Unknown	751
Total	76,246

8,188 TEMPORARY INJURIES OCCURRING IN THE EXTRACTION OF RAW MATERIALS FROM EARTH (MINES, QUARRIES AND OIL FIELDS).

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$7,100 00	$8,955 98	$16,055 98
Dangerous substances	5,393 00	9,871 75	15,264 75
Falling, rolling and flying objects	18,219 00	21,853 86	40,072 86
Personal falls	14,450 00	10,939 29	25,389 29
General or all other causes	19,646 00	27,236 93	46,882 93
Unknown	715 00	790 10	1,505 10
Totals	$65,523 00	$79,647 91	$145,170 91



MANUFACTURING
21772 INJURIES OCCURRING IN 1915 AND
18433 INJURIES OCCURRING IN 1914
CHARTED BY CAUSES AND COSTS

	1915	1914
Compensation Paid	$ 143,156.00	$ 149,073.00
Medical Costs	204,045.66	168,965.77
Total Costs	347,201.66	318,038.77
Ave. Compensation	6.73	8.09
Ave. Medical Cost	9.59	9.17
Ave. Cost	$16.32	$17.26

Chart No. 30.

A STUDY OF 8,188 TEMPORARY INJURIES OCCURRING IN THE EXTRACTION OF RAW MATERIALS FROM EARTH (MINES, QUARRIES AND OIL FIELDS).

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

624 Temporary Injuries Due to Machinery.

Air hammers and riveters and all compressed air engines and devices, 72. Backfires of motors and engines when cranking or starting, 52. Slipping, breaking, etc., of power transmitting belts (main), 41. Slipping, breaking, etc., of power transmitting belts (secondary), 8. Chain transmission, 7. Drills, dies, punches, metal stamps and presses, 35. Dynamos, 2. All platform elevators, including skips and buckets, 42. Electric fans, motors, etc., 4. Emery wheel accidents, 5. Explosions of steam containers, 2. Feed rolls of all classes, 1. Friction wheels, 3. Gas engines or internal combustion motors, 27. Gears and cogs, 21. All hoisting apparatus, other than platform elevators, 121. Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers, 2. Power-driven saws, either band or circular, 19. Set screws, 5. Shafting and conveyors, 16. Shears, cutters, grinders, etc., 2. Steam engines, 22. Treadmills and windlasses, 11. Lathes, 2. Machinery, without mechanical power, such as jacks, levers, etc., 49. All injuries not otherwise classified, caused by machinery peculiar to the operation of mines and quarries, 27. All injuries not otherwise classified, caused by machinery peculiar to the extraction of oil, 20. All other machines, 6.

1,235 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 36. Powder, 12. Dynamite, 10. Explosion and combustion of gases, 43. Explosion and combustion of petroleum, 4. Explosion and combustion of benzine, 14. Flames from ovens, oil burners, furnaces, etc., 18. Other fires, unprotected blazes, etc., 9. Hot metals, slags, ashes, etc., and other hot materials, 81. Steam, hot water and other hot liquids, 74. Caustics, alkalies, acids, quicklime, etc., 63. Inhaling of poisonous gases, 27. Splinters, slivers, glass, nails and other sharp objects, 800. All other materials, poisonous or inherently dangerous, 44.

2,639 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stones, sand and earth, including cave-ins in mines, etc., 1,197. Falling buildings, walls and similar structures, 7. Falling scaffolds and stagings, due to being improperly constructed or supported, 12. Falling piles of materials, such as lumber, etc., 22. All flying objects, including flying particles of steel, emery, etc., 1,128. All other classes of falling and rolling objects not included in the above classes, 273.

758 Temporary Injuries Due to Personal Falls.

Falls from ladders, due to loss of balance or due to ladder slipping, breaking or collapsing, 61. Falls on or from stairs, due to loss of balance or slipping or due to defects in construction of stairs, etc., 22. Falls from scaffolds, due to slipping or loss of balance or due to improper construction of same, 39. Falls from buildings in course of construction, 3. All falls from windows, including those where proper safeguards are not provided or where injured neglects to use same, 6. Falls from roofs, due to slipping or losing balance or lack of proper safeguards, 16. All other falls from elevations which can not conveniently be grouped under the above classifications, 154. Falls into shafts, due to slipping or falling or due to shaft being improperly protected, 4. Falls into all other unprotected openings, 20. Slipping or falling on even ground or ordinary surfaces, 207. All other falls not otherwise classified, 226.

2,743 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in discharge of duties, 2. All injuries due to animal agency, including kicks, bites, etc., 86. Carriage accidents, including all animal-drawn vehicles, 47. All injuries due to revolvers and guns, 2. Hand tools and hand machinery, such as hammers, knives, axes, etc., 685. All intoxication cases, 2. All motor-driven vehicle accidents, 54. Occupational diseases, including infections and disorders arising from working conditions, 36. Railroad and street car accidents, 77. Riding accidents, either being thrown or falling from horses or bicycles, 14. Running into or striking stationary objects, protruding or otherwise, 195. All shipping and navigation accidents, 4. Transporting or handling heavy weights, 440. Objects slipping or falling while handling or working with same, 844. Swinging or rebounding objects that are attached to foundations, 71. All other cases, not included in above classes, 184.

Injuries where the causes are unknown, 189.

21,272 TEMPORARY INJURIES OCCURRING IN MANUFACTURING.

Grouped by Subindustry.

Time: 12 Months—January 1 to December 31, 1915.

Manufacturing.

Stone and earth products	583
Raw metals in blast furnaces or by founding and smelting or rolling all rough preparation of metals	1,674
Machine manufacture, manufacture of tools, instruments, and the fashioning of any metals requiring special tools, machines and skill	3,496
All metal or metal-wood assembling. (Fixed tools and semiskilled labor.) Machine repairing, overhauling, etc., including garages	2,357
Lumbering, felling and milling of trees	3,804
All woodworking and cabinet making, including vehicles of both wood and wood-metal	694
Tanning and manufacturing of leathers and leather goods	204
Rubber manufacture and all composition goods, etc.	157
Chemicals and allied products	148
Paper and all paper products	248
Printing, publishing and binding	493
Textiles	67
Nontextiled clothing, and all furnishings for wear	260
Food, beverages, tobacco, drugs, etc.	5,824
Miscellaneous manufacture	425
Explosives	106
Paints, glass and oil	460
Soaps	45
Ropes and cordage	33
Oil refining	193
Unknown	1
Total	21,272

21,272 TEMPORARY INJURIES OCCURRING IN MANUFACTURING.

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

Machinery	2,995
Dangerous substances	4,557
Falling, rolling and flying objects	3,972
Personal falls	1,840
General or all other causes	7,486
Unknown	422
Total	21,272

21,272 TEMPORARY INJURIES OCCURRING IN MANUFACTURING.

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

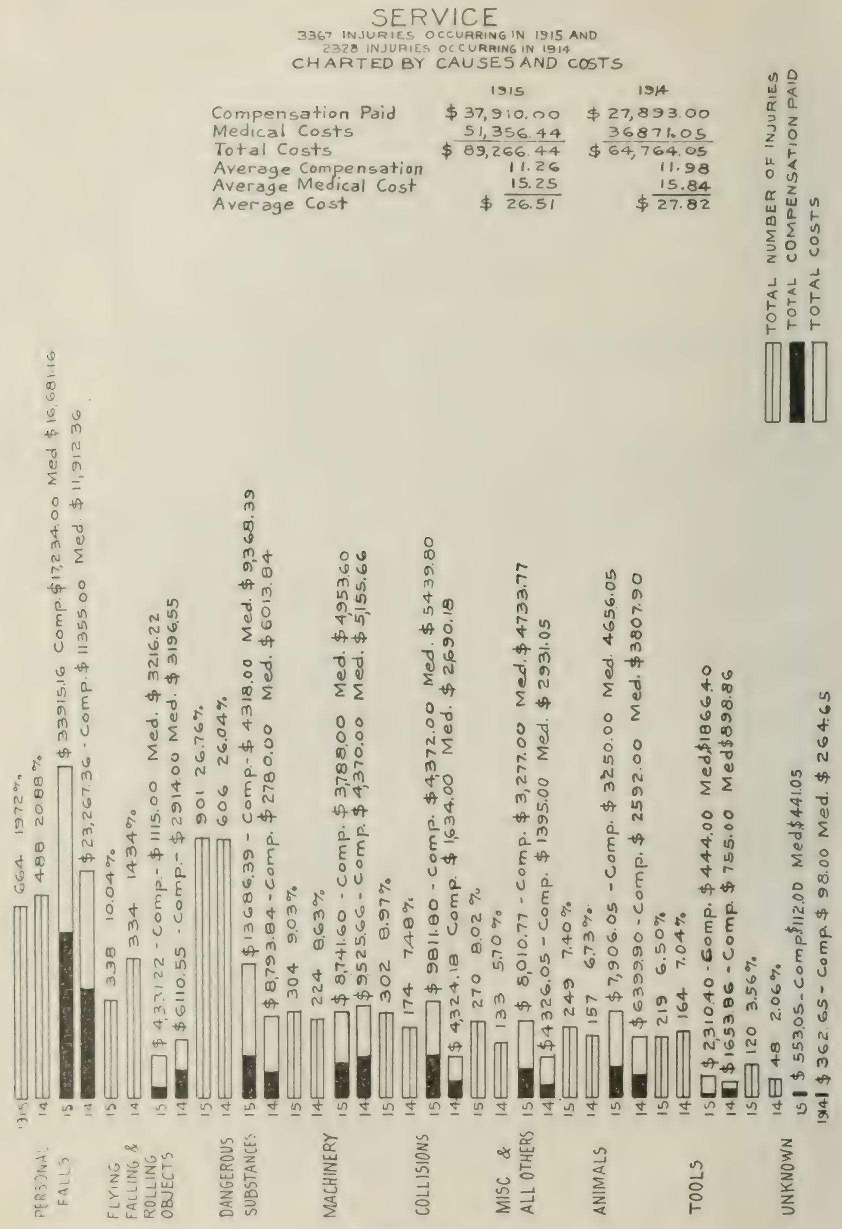
Machinery	34,872
Dangerous substances	27,060
Falling, rolling and flying objects	23,479
Personal falls	30,448
General or all other causes	74,691
Unknown	2,552
Total	193,102

21,272 TEMPORARY INJURIES OCCURRING IN MANUFACTURING.

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$26,043 00	$34,363 30	$60,406 30
Dangerous substances	12,578 00	37,521 89	50,099 89
Falling, rolling and flying objects	17,380 00	26,776 37	44,156 37
Personal falls	30,658 00	27,712 84	58,370 84
General or all other causes	53,966 00	73,605 98	127,571 98
Unknown	2,531 00	4,065 28	6,596 28
Totals	$143,156 00	$204,045 66	$347,201 66



SERVICE
3367 INJURIES OCCURRING IN 1915 AND
2328 INJURIES OCCURRING IN 1914
CHARTED BY CAUSES AND COSTS

	1915	1914
Compensation Paid	$ 37,910.00	$ 27,893.00
Medical Costs	51,356.44	36871.05
Total Costs	$ 89,266.44	$ 64,764.05
Average Compensation	11.26	11.98
Average Medical Cost	15.25	15.84
Average Cost	$ 26.51	$ 27.82

Chart No. 31.

21,272 TEMPORARY INJURIES OCCURRING IN MANUFACTURING.

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

2,995 Temporary Injuries Due to Machinery.

Air hammers, riveters and all compressed air engines and devices, 44. Back-fires of motors and engines when cranking or starting, 323. Slipping, breaking, etc., of power transmitting belts (main), 121. Slipping, breaking, etc., of power transmitting belts (secondary), 33. Chain transmission, 38. Drills, dies, punches, metal stamps and presses, 175. Dynamos, 2. All platform elevators, including skips and buckets, 95. Electric fans, motors, etc., 28. Emery wheel accidents, 104. Explosions of steam containers, 6. Feed rolls of all classes, including mangles and body ironers in laundries, 95. Friction wheels, 3. Gas engines or internal combustion motors, 26. Gears and cogs, 128. All hoisting apparatus, other than platform elevators, 201. Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers, 209. Piledrivers and bull-dozers, 2. Power-driven saws, either band or circular, 441. Set screws, 11. Shafting and conveyors, 70. Shears, cutters, grinders, etc., used in the preparation of foodstuffs, 36. Shears and cutters used in the working of metals and the manufacturing of paper, textiles, etc., 77. Steam engines, 29. Steam piping, 1. Treadmills and windlasses, 16. Lathes, 39. Machinery without mechanical power, such as jacks, levers, etc., 85. All injuries not otherwise classified, caused by machinery peculiar to the manufacturing of brick, cement and concrete, 8. All injuries not otherwise classified, caused by machinery peculiar to the manufacturing of foodstuffs, etc., 153. All injuries caused by machinery peculiar to the manufacturing of leather and rubber, 13. All injuries, not otherwise classified, caused by machinery peculiar to the lumbering industry, 67. All injuries, not otherwise classified, caused by machinery peculiar to the working of metals and the manufacturing of machinery, 100. All injuries not otherwise classified, caused by machinery peculiar to the manufacturing and printing of paper, 92. All injuries not otherwise classified, caused by machinery peculiar to the manufacturing of textiles and clothing, 63. All other machines, 61.

4,557 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 50. Powder, 1. Dynamite, 3. Explosion and combustion of gases, 42. Explosion and combustion of petroleum, 5. Explosion and combustion of benzine, 39. Flames from ovens, oil burners, furnaces, etc., 55. Other fires, unprotected blazes, etc., 54. Hot metals, slags, ashes, etc., and other hot materials, 475. Steam, hot water and other hot liquids, 264. Caustics, alkalies, acids, quicklime, etc., 277. Inhaling of poisonous gases, 19. Splinters, slivers, glass, nails and other sharp objects, 3,136. All other materials, poisonous or inherently dangerous, 137.

3,972 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stones, sand and earth, including cave-ins, etc., 62. Falling buildings, walls and similar structures, 11. Falling scaffolds and stagings due to being improperly constructed or supported, 5. Falling piles of material, such as lumber, etc., 166. All flying objects, including flying particles of steel, emery, etc., 2,710. All other classes of falling and rolling objects not included in the above classes, 1,018.

1,840 Temporary Injuries Due to Personal Falls.

Falls from ladders, due to loss of balance or due to ladder slipping, breaking or collapsing, 164. Falls on or from stairs due to loss of balance, or slipping or due to defects in construction of stairs, etc., 94. Falls from scaffolds, due to slipping or loss of balance or due to improper construction of same, 60. Falls from buildings in course of construction, 6. All falls from windows, including those where proper safeguards are not provided, or where injured neglects to use same, 2. Falls from roofs, due to slipping or losing balance or lack of proper guards, 18. All other falls from elevations which can not conveniently be grouped under the above classifications, 383. Falls into shafts, due to slipping or falling or due to shaft being improperly protected, 10. Falls into excavations due to slipping or losing balance, etc., 10. Falls into cellars, 6. Falls into all other unprotected openings, 57. Slipping or falling on even ground or ordinary surfaces, 623. All other falls not otherwise classified, 407.

7,486 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in discharge of duties, 30. All injuries due to animal agency, including kicks, bites, etc., 229. Carriage accidents, including all animal-drawn vehicles, 152. All injuries due to revolvers and guns, 7. Hand tools and hand machinery, such as hammers, knives, axes, etc., 2,109. All intoxication cases, 4. All motor-driven vehicle accidents, 208. Occupational diseases, including infections and disorders arising from working conditions, 165. Railroad and street car accidents, 88. Riding accidents, either being thrown or falling from horses or bicycles, 59. Running into or striking stationary objects, protruding or otherwise, 610. All shipping and navigation accidents, 8. Transporting or handling heavy weights, 1,096. Objects slipping or falling while handling or working with same, 2,127. Swinging or rebounding objects that are attached to foundations, 241. All other cases, not included in the above classes, 353.

Injuries where the causes are unknown, 422.

3,367 TEMPORARY INJURIES OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Grouped by Subindustry.

Time: 12 Months—January 1 to December 31, 1915.

Service.

Real estate where no construction is done. Banks, insurance and loan companies; brokerage of all kinds; architects, lawyers, public stenographers and agencies of all kinds, and clerical and office work, where the only hazard is clerical in nature	211
Hotels, apartment houses, office buildings, clubs and resorts	809
Hospitals	97
Janitor service and window-cleaning associations; street-sweeping service (by private parties), etc.	16
Laundries and cleaning establishments	473
Military associations, etc.	4
Professional, including doctors, dentists, undertakers, barbers, manicurers, hairdressers and all ministering to the human body	49
Domestic service (house servants, gardeners, etc.)	139
Schools, churches, libraries, observatories, educational and charitable institutions of all kinds	176
Sports and amusements	1,331
Private police and detective agencies	15
Private fire protection (underwriters, etc.)	10
Cemeteries, crematories, etc.	19
Veterinaries, dog and animal pounds and hospitals, etc.	3
Toll road keepers, parking stations, etc.	8
Artists, etc.	2
Chemists—professional service	5
Total	3,367

3,367 TEMPORARY INJURIES OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

Machinery	304
Dangerous substances	903
Falling, rolling and flying objects	185
Personal falls	667
General or all other causes	1,188
Unknown	120
Total	3,367

3,367 TEMPORARY INJURIES OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

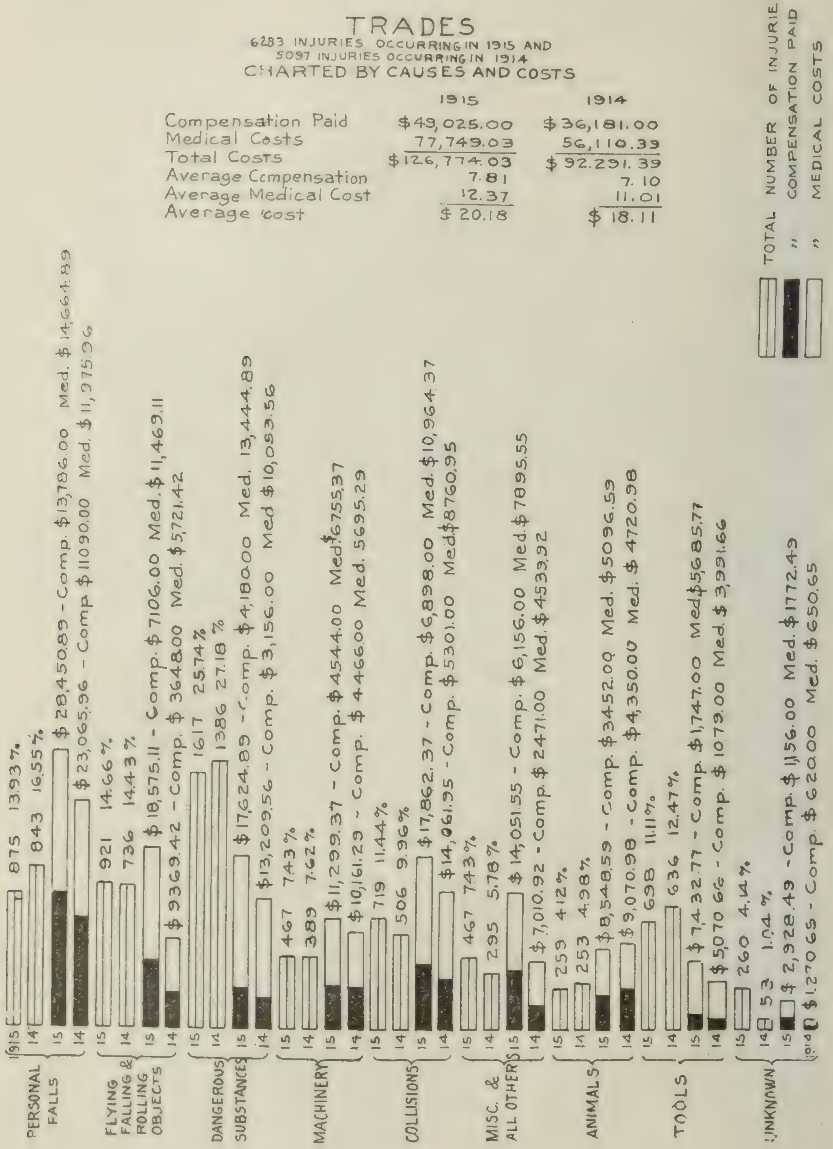
Machinery	4,310
Dangerous substances	6,744
Falling, rolling and flying objects	1,464
Personal falls	13,463
General or all other causes	13,353
Unknown	392
Total	39,726

3,367 TEMPORARY INJURIES OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$3,788 00	$4,953 60	$8,741 60
Dangerous substances	4,318 00	9,379 89	13,697 89
Falling, rolling and flying objects	564 00	1,621 09	2,185 09
Personal falls	17,234 00	16,738 66	33,972 66
General or all other causes	11,894 00	18,222 15	30,116 15
Unknown	112 00	441 05	553 05
Totals	$37,910 00	$51,356 44	$89,266 44



TRADES
6283 INJURIES OCCURRING IN 1915 AND
5097 INJURIES OCCURRING IN 1914
CHARTED BY CAUSES AND COSTS

	1915	1914
Compensation Paid	$49,025.00	$36,181.00
Medical Costs	77,749.03	56,110.39
Total Costs	$126,774.03	$92.291.39
Average Ccmpensation	7.81	7.10
Average Medical Cost	12.37	11.01
Average cost	$20.18	$18.11

Chart No. 32.

3,367 TEMPORARY INJURIES OCCURRING IN MISCELLANEOUS SPECIALIZED INDUSTRIES WHICH HAVE BEEN CONVENIENTLY GROUPED UNDER THE HEAD "SERVICE."

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

304 Temporary Injuries Due to Machinery.

Air hammers and riveters and all compressed air engines and devices, 1. Backfires of motors and engines when cranking or starting, 53. Slipping, breaking, etc., of power transmitting belts (main), 5. Chain transmission, 2. Drills, dies, punches, metal stamps and presses, 2. Dynamos, 1. All platform elevators, 37. Electric fans, motors, etc., 5. Emery wheel accidents, 2. Feed rolls of all classes, including mangles and body ironers in laundries, 63. Gas engines or internal combustion motors, 2. Gears and cogs, 22. All hoisting apparatus other than platform elevators, 5. Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers, 12. Power-driven saws, either band or circular, 16. Set screws, 1. Shafting and conveyors, 5. Shears, cutters, grinders, etc., used in the preparation of foodstuffs, 6. Shears and cutters used in the working of metals, 1. Steam engines, 10. Steam piping, 1. Lathes, 1. Machinery without mechanical powers, such as jacks, levers, etc., 5. All injuries not otherwise classified, caused by machinery peculiar to laundries, 31. All other machines, 15.

903 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 18. Powder, 64. Dynamite, 3. Explosion and combustion of gases, 25. Explosion and combustion of petroleum, 1. Explosion and combustion of benzine, 9. Flames from ovens, oil burners, furnaces, etc., 12. Other fires, unprotected blazes, etc., 31. Hot metals, slags, ashes, etc., and other hot materials, 30. Steam, hot water and other hot liquids, 94. Caustics, alkalies, acids, quicklime, etc., 33. Inhaling of poisonous gases, 4. Splinters, slivers, glass, nails and other sharp objects, 527. All other materials, poisonous or inherently dangerous, 52.

185 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stones, sand and earth, including cave-ins, etc., 5. Falling buildings, walls and similar structures, 1. Falling scaffolds and stagings due to being improperly constructed or supported, 4. Falling piles of material, such as lumber, etc., 10. All flying objects, including flying particles of steel, emery, etc., 76. All other classes of falling and rolling objects not included in the above classes, 89.

667 Temporary Injuries Due to Personal Falls.

Falls from ladders due to loss of balance or due to ladder slipping, breaking or collapsing, 61. Falls on or from stairs due to loss of balance or slipping or due to defects in construction of stairs, etc., 89. Falls from scaffolds due to slipping or loss of balance or due to improper construction of same, 21. Falls from buildings in course of construction, 5. All falls from windows including those where proper safeguards are not provided or where injured neglects to use same, 4. Falls from roofs, due to slipping or losing balance or lack of proper guards, 5. All other falls from elevations which can not conveniently be grouped under the above classifications, 96. Falls into shafts due to slipping or falling or due to shaft being improperly protected, 11. Falls into excavations due to slipping or losing balance, etc., 5. Falls into all other unprotected openings, 12. Slipping or falling on even ground or ordinary surfaces, 208. All other falls, not otherwise classified, 150.

1,188 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in discharge of duties, 29. All injuries due to animal agency, including kicks, bites, etc., 118. Carriage accidents, including all animal-drawn vehicles, 36. All injuries due to revolvers and guns, 21.

Hand tools and hand machinery such as hammers, knives, axes, etc., 219. All intoxication cases, 9. All motor-driven vehicle accidents, 129. Occupational diseases, including infections and disorders arising from working conditions, 36. Railroad and street car accidents, 14. Riding accidents, either being thrown or falling from horses or bicycles, 79. Running into or striking stationary objects, protruding or otherwise, 90. All shipping and navigation accidents, 1. Transporting or handling heavy objects, 130. Objects slipping or falling while handling or working with same, 123. Swinging or rebounding objects that are attached to foundations, 25. All other cases not included in above classes, 129.

Injuries where the causes are unknown, 120.

6,283 TEMPORARY INJURIES OCCURRING IN MERCANTILE TRADES.

Grouped by Subindustry.

Time: 12 Months—January 1 to December 31, 1915.

Mercantile Trades.

Wholesale—	
Machinery and its parts of all kinds, including farm vehicles and implements, builders' hardware, belting, plumbers' supplies, stores, rubber goods, etc.	332
Light hardware, crockery, wooden and willow ware, trunks, leather goods, etc.	25
Furniture, pianos, carpets, bedding, household furnishings, including bar fixtures and supplies	20
Dry goods, clothing, shoes, hats and all wearing apparel	40
Foodstuffs, including groceries, produce and commission houses, tobacco and cigars, drugs, wines and liquors. (for slaughtering, see "Manufacturing")	509
Hay, grain, coal, wood and building materials of all kinds	124
Paints, oils, glass and wall paper, etc.	39
Scrap iron, bottle yards, junk dealers, etc.	52
Physicians' and dentists' supplies, drawing instruments and supplies, photographic sundries, etc., jewelers and opticians	10
Paper and bags, stationery and all paper products, notions and toys, etc.	49
Miscellaneous	40
Retail—	
Machinery and its parts, oil well supplies, ship chandlers, farm implements and vehicles	79
Auto accessories, motorcycles and bicycles, sporting goods, firearms, etc.	95
Light hardware, household goods, crockery and glassware, lighting fixtures, art goods, typewriters and adding machines, etc.	252
Furniture, pianos, carpets, bedding, sewing machines, trunks and leather goods	268
Dry goods, clothing stores, wearing apparel of all kinds, general merchandise stores and department stores	1,285
Foodstuffs, groceries, wines and liquors, drugs, milk and ice deliveries, candy and ice cream stores and delicatessen shops (excluding butcher shops, etc.)	1,292
Butcher shops, fish and oyster stalls and poultry stands	454
Paints, oils, glass and wall paper, etc.	44
News agents, paper carriers, etc., books and stationery and sheet music	41
Restaurants, cafeterias, caterers and commissaries, etc. (for hotel dining-rooms, see "Service")	796
Hay, grain, coal, wood and building materials	380
Opticians, jewelers, etc.	27
Horse markets and all trading in live stock, where dealers do not do the breeding and raising	7
Florists, etc.	23
Total	6,283

6,283 TEMPORARY INJURIES OCCURRING IN MERCANTILE TRADES.

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

Machinery	468
Dangerous substances	1,617
Falling, rolling and flying objects	417
Personal falls	875
General or all other causes	2,646
Unknown	260
Totals	6,283

6,283 TEMPORARY INJURIES OCCURRING IN MERCANTILE TRADES.

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

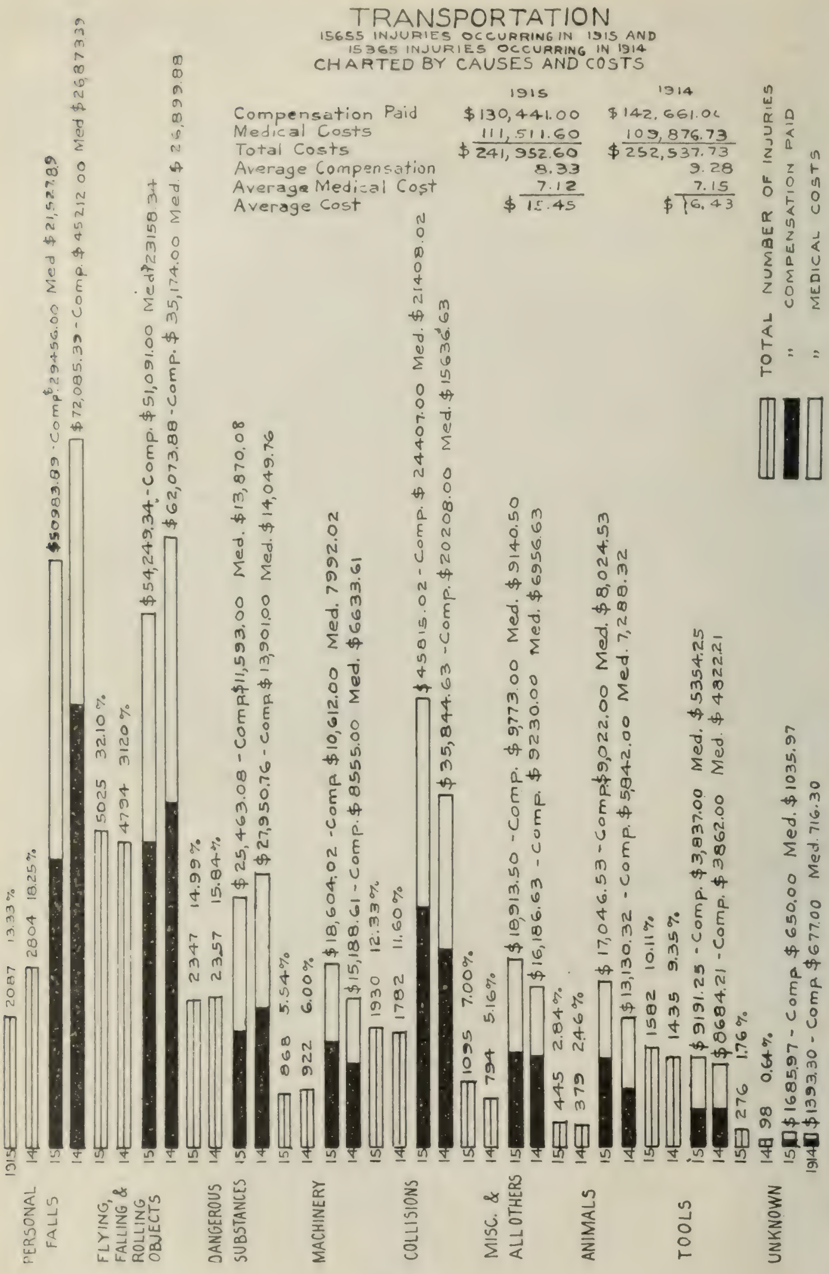
Machinery	5,548
Dangerous substances	9,877
Falling, rolling and flying objects	3,078
Personal falls	14,661
General or all other causes	30,140
Unknown	1,490
Total	64,794

6,283 TEMPORARY INJURIES OCCURRING IN MERCANTILE TRADES.

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$4,544 00	$6,761 37	$11,305 37
Dangerous substances	4,180 00	13,444 89	17,624 89
Falling, rolling and flying objects	2,113 00	5,262 39	7,375 39
Personal falls	13,786 00	14,658 89	28,444 89
General or all other causes	23,246 00	35,849 00	59,095 00
Unknown	1,156 00	1,772 49	2,928 49
Totals	$49,025 00	$77,749 03	$126,774 03



TRANSPORTATION
15655 INJURIES OCCURRING IN 1915 AND
15365 INJURIES OCCURRING IN 1914
CHARTED BY CAUSES AND COSTS

	1915	1914
Compensation Paid	$130,441.00	$142,661.00
Medical Costs	111,511.60	109,876.73
Total Costs	$241,952.60	$252,537.73
Average Compensation	8.33	9.28
Average Medical Cost	7.12	7.15
Average Cost	$15.45	$16.43

Chart No. 33.

6,283 TEMPORARY INJURIES OCCURRING IN MERCANTILE TRADES.

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

468 Temporary Injuries Due to Machinery.

Air hammers and riveters and all compressed air engines and devices, 128. Slipping, breaking, etc., of power transmitting belts (secondary), 6. Chain transmission, 4. Drills, dies, punches, metal stamps and presses, 11. Dynamos, 2. All platform elevators, including skips and buckets, 60. Electric fans, motors, etc., 14. Emery wheel accidents, 3. Explosions of steam containers, 2. Feed rolls of all classes, 8. Gas engines or internal combustion motors, 2. Gears and cogs, 12. All hoisting apparatus, other than platform elevators, 14. Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers, 5. Power-driven saws, either band or circular, 19. Set screws, 1. Shafting and conveyors, 5. Shears, cutters, grinders, etc., used in the preparation of foodstuffs, 89. Shears and cutters, used in the working of metals and the manufacturing of paper, textiles, etc., 2. Steam engines, 2. Treadmills and windlasses, 2. Lathes, 1. Machinery without mechanical power, such as jacks, levers, etc., 23. All other machines, 53.

1,617 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 13. Powder, 1. Dynamite, 2. Explosion and combustion of gases, 21. Explosion and combustion of petroleum, 4. Explosion and combustion of benzine, 5. Flames from ovens, oil burners, furnaces, etc., 4. Other fires, unprotected blazes, etc., 17. Hot metals, slags, ashes, etc., and other hot materials, 12. Steam, hot water and other hot liquids, 131. Caustics, alkalies, acids, quicklime, etc., 41. Inhaling of poisonous gases, 3. Splinters, slivers, glass, nails and other sharp objects, 1,311. All other materials, poisonous or inherently dangerous, 52.

417 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stones, sand and earth, including cave-ins, etc., 5. Falling buildings, walls and similar structures, 5. Falling scaffolds and stagings due to being improperly constructed or supported, 1. Falling piles of material, such as lumber, etc., 34. All flying objects, including flying particles of steel, emery, etc., 177. All other classes of falling and rolling objects not included in the above classes, 195.

875 Temporary Injuries Due to Personal Falls.

Falls from ladders, due to loss of balance or due to ladder slipping, breaking, etc., 94. Falls on or from stairs, due to loss of balance or slipping or due to defects in construction of stairs, etc., 145. Falls from scaffolds due to slipping or loss of balance or due to improper construction of same, 6. Falls from buildings in course of construction, 2. All falls from windows, including those where proper safeguards are not provided or where injured neglects to use same, 1. Falls from roofs, due to slipping or losing balance or lack of proper guards, 6. All other falls from elevations which can not conveniently be grouped under the above classifications, 151. Falls into shafts, due to slipping or falling or due to shaft being improperly protected, 7. Falls into excavations due to slipping or losing balance, etc., 2. Falls into cellars, 5. Falls into all other unprotected openings, 10. Slipping or falling on even ground or ordinary surfaces, 318. All other falls not otherwise classified, 128.

2,646 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in the discharge of duties, 17. All injuries due to animal agency, including kicks, bites, etc., 157. Carriage accidents, including all animal-drawn vehicles, 135. All injuries due to revolvers and guns, 5. Hand tools and hand machinery, such as hammers, knives, axes, etc., 698. All intoxication cases, 7. All motor-driven vehicle accidents, 221. Occupational diseases, including infections and disorders arising from working conditions, 19. Railroad and street car accidents, 12. Riding accidents, either being thrown or falling from horses or bicycles, 71. Running into or striking stationary objects, protruding or otherwise, 237. All shipping and navigation accidents, 2. Transporting or handling heavy weights, 386. Objects slipping or falling while handling or working with same, 436. Swinging or rebounding objects that are attached to foundations, 67. All other cases, not included in above classes, 176.

Injuries where the causes are unknown, 260.

15,655 TEMPORARY INJURIES ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO INJURIES OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Grouped by Subindustry.

Time: 12 Months—January 1 to December 31, 1915.

Transportation and Public Utilities.

Transportation—	
Cartage, storage, taxicab service and livery stables	1,167
Express companies	266
Pipe lines	192
Railroad auxiliaries (sleeping car service, dining car service, refrigerating cars, oil tank lines, etc.)	228
Cable railways	16
Electric railways—street, interurban, etc.	1,145
Steam railroads	7,624
Stage lines	22
Steamship and water transportation of all kinds	778
Stevedoring	427
Warehousing (for household storage, see "Cartage, storage, taxicab service and livery stables")	233
Messenger service, other than telegraph companies	5
Produce shippers, etc., such as vegetable shippers, etc., where there is no particular preparation of the article	35
Public Utilities—	
Public corporations (city, county and state governments, including police, fire and water departments' clerical work, etc., but excluding highway and road work which is under "Construction", and hospitals and schools which class under "Service")	1,187
Electric light and power (not municipal)	1,324
Gas works (not municipal)	178
Incinerators (rubbish and garbage disposal)	26
Telegraph and telephone companies	504
Water works (not municipal)	298
Total	15,655

15,655 TEMPORARY INJURIES ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO INJURIES OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

Machinery	868
Dangerous substances	2,347
Falling, rolling and flying objects	2,401
Personal falls	2,087
General or all other causes	7,676
Unknown	276
Total	15,655

15,655 TEMPORARY INJURIES ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO INJURIES OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

Machinery	11,560
Dangerous substances	17,246
Falling, rolling and flying objects	19,277
Personal falls	36,060
General or all other causes	93,328
Unknown	1,148
Total	178,619

15,655 TEMPORARY INJURIES ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO INJURIES OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
Machinery	$10,612 00	$7,969 27	$18,581 27
Dangerous substances	11,593 00	13,857 83	25,450 83
Falling, rolling and flying objects	15,674 00	11,997 10	27,671 10
Personal falls	29,456 00	21,527 89	50,983 89
General or all other causes	62,456 00	55,123 54	117,579 54
Unknown	650 00	1,035 97	1,685 97
Totals	$130,441 00	$111,511 60	$241,952 60

15,655 TEMPORARY INJURIES ARISING OUT OF ALL FORMS OF TRANSPORTATION ENTERPRISES; ALSO INJURIES OCCURRING IN ENTERPRISES OF PUBLIC UTILITIES.

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

868 Temporary Injuries Due to Machinery.

Air hammers and riveters and all compressed air engines and devices, 74. Backfires of motors and engines when cranking or starting, 118. Slipping, breaking, etc. of power transmitting belts (main), 16. Slipping, breaking, etc., of power transmitting belts (secondary), 8. Chain transmission, 5. Drills, dies, punches, metal stamps and presses, 49. Dynamos, 2. All platform elevators, including skips and buckets, 23. Electric fans, motors, etc., 15. Emery wheel accidents, 53. Explosions of steam containers, 5. Feed rolls of all classes, including mangles and body ironers in laundries, 1. Gas engines or internal combustion motors, 10. Gears and cogs, 39. All hoisting apparatus, other than platform elevators, 148. Jointers, edgers, slicers, stayers, planers, sanders, stickers and veneerers, 15. Pile-drivers and bulldozers, 3. Power-driven saws, either band or circular, 29. Set screws, 7. Shafting and conveyors, 5. Shears, cutters, grinders, etc., used in the preparation of foodstuffs, 5. Shears and cutters used in the working of metals and the manufacturing of paper, textiles, etc., 12. Steam engines, 41. Steam piping, 2. Treadmills and windlasses, 7. Wind motors or wind turbines, 1. Lathes, 19. Machinery without mechanical power, such as jacks, levers, etc., 132. All other machines, 24.

2,347 Temporary Injuries Due to Dangerous Substances Such as Electric Currents, Caustics, Poisonous Gases, Etc.

Electric currents, 167. Powder, 15. Dynamite, 6. Explosion and combustion of gases, 82. Explosion and combustion of petroleum, 5. Explosion and combustion of benzine, 31. Flames from ovens, oil burners, furnaces, etc., 22. Other fires, unprotected blazes, etc., 64. Hot metals, slags, ashes, etc., and other hot materials, 140. Steam, hot water and other hot liquids, 196. Caustics, alkalies, acids, quicklime, etc., 64. Inhaling of poisonous gases, 18. Splinters, slivers, glass, nails and other sharp objects, 1,458. All other materials, poisonous or inherently dangerous, 79.

2,401 Temporary Injuries Due to Falling, Rolling and Flying Objects.

Falling stones, sand and earth, including cave-ins, etc., 138. Falling buildings, walls and similar structures, 11. Falling scaffolds and stagings, due to being improperly constructed or supported, 5. Falling piles of material such as lumber, etc., 132. All flying objects, including flying particles of steel, emery, etc., 1,399. All other classes of falling and rolling objects not included in the above classes, 716.

2,087 Temporary Injuries Due to Personal Falls.

Falls from ladders due to loss of balance or due to ladder slipping, breaking or collapsing, 134. Falls on or from stairs due to loss of balance or slipping or due to defects in construction of stairs, etc., 81. Falls from scaffolds due to slipping or loss of balance or due to improper construction of same, 48. Falls from buildings in course of construction, 1. All falls from windows, including those where proper safeguards are not provided or where injured neglects to use same, 2. Falls from roofs, due to slipping or losing balance or lack of proper guards, 5. All other falls from elevations which can not conveniently be grouped under the above classifications, 455. Falls into shafts due to slipping or falling or due to shaft being improperly protected, 2. Falls into excavations due to slipping or losing balance, etc., 26. Falls into cellars, 5. Falls into all other unprotected openings, 81. Slipping or falling on even ground or ordinary surfaces, 483. All other falls not otherwise classified, 764.

7,676 Temporary Injuries Due to General or All Other Causes.

Altercations with other employees or persons while in discharge of duties, 85 All injuries due to animal agency, including kicks, bites, etc., 257. Carriage accidents, including all animal-drawn vehicles 181. All injuries due to revolvers and guns, 17. Hand tools and hand machinery, such as hammers, knives, axes, etc., 1,582. All intoxication cases, 22. All motor-driven vehicle accidents, 389. Occupational diseases, including infections and disorders arising from working conditions, 44. Railroad and street car accidents, 523. Riding accidents, either being thrown or falling from horses or bicycles, 98. Running into or striking stationary objects, protruding or otherwise, 573. All shipping and navigation accidents, 12. Transporting or handling heavy objects, 921. Objects slipping or falling while handling or working with same, 2,311. Swinging or rebounding objects that are attached to foundations, 316. All other cases not included in the above classes, 347.

Injuries where the causes are unknown, 276.

9 TEMPORARY INJURIES IN WHICH THE INDUSTRY IS UNKNOWN.

Time: 12 Months—January 1 to December 31, 1915.

Unknown Industry.

Unknown	9

9 TEMPORARY INJURIES IN WHICH THE INDUSTRY IS UNKNOWN.

Time: 12 Months—January 1 to December 31, 1915.

Chief Causes.

General or all other causes	2
Unknown	7
Total	9

9 TEMPORARY INJURIES WHERE THE INDUSTRY IS UNKNOWN.

Time: 12 Months—January 1 to December 31, 1915.

Time Lost in Days, by Chief Causes.

General or all other causes	34
Unknown	50
Total	84

9 TEMPORARY INJURIES WHERE THE INDUSTRY IS UNKNOWN.

Time: 12 Months—January 1 to December 31, 1915.

Amounts Paid in Compensation and Medical Benefits, by Chief Causes.

Cause	Compensation	Medical benefits	Total
General or all other causes	$50 00		$50 00
Unknown	59 00	$48 10	107 10
Totals	$109 00	$48 10	$157 10

9 TEMPORARY INJURIES IN WHICH THE INDUSTRY IS UNKNOWN.

Grouped by Main and Specific Causes.

Time: 12 Months—January 1 to December 31, 1915.

2 Temporary Injuries Due to General or All Other Causes.

Carriage accidents, including all animal-drawn vehicles, 1. Transporting or handling heavy weights, 1.

Injuries where causes are unknown, 7.

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BIENNIAL REPORT

OF THE

SECRETARY OF STATE

OF THE

STATE OF CALIFORNIA

FOR THE

Sixty-sixth and Sixty-seventh Fiscal Years, Beginning
July 1, 1914, and Ending June 30, 1916

FRANK C. JORDAN, Secretary of State

CALIFORNIA
STATE PRINTING OFFICE
1916

25122

REPORT OF SECRETARY OF STATE.

State of California, Department of State,
Sacramento, August 14, 1916.

To His Excellency, Hiram W. Johnson,
Governor of the State of California.

Sir: I have the honor to present herewith my third biennial report as Secretary of State, which contains a statement of all fees received by this office from July 1, 1914, to June 30, 1916, inclusive. The report also includes a statement of expenditures and the amount drawn against the several appropriations made for the support of this department.

The records of this office, kept as provided by subdivisions 2, 3 and 4 of section 408 of the Political Code, show that the Governor has granted 33 pardons, 27 commutations of sentence, and 33 reprieves; has signed 730 restorations to citizenship; has issued 34 holiday and other proclamations; has granted 2,002 orders of release of prisoners from state prisons under the Goodwin Act; has signed 446 land patents; has commissioned 3,910 notaries public and 31 commissioners of deeds; has made 619 executive appointments, and has approved 67 official bonds.

The total receipts of this department from all sources during the last two fiscal years, ending June 30, 1916, were $1,129,143.78. Receipts for previous two fiscal years ending June 30, 1914, $2,162,334.75.

The License Tax Department collected from July 1, 1914, to June 30, 1915, $10,247.50; from July 1, 1915, to June 30, 1916, $776,628.42; making the total license taxes collected during the two fiscal years, $786,875.22.

An examination of the financial statement shows, $342,267.86, was collected during the last two fiscal years as general office fees.

The following is a comparative statement of work done in registry department, fiscal years 1914–1915 and 1915–1916:

Kind filed	Fiscal years		Increase	Decrease
	66th. 67th	64th. 65th		
Articles of incorporation (domestic)	4,765	7,246	--------	2,481
Articles of incorporation (foreign)	415	440	--------	25
Official bonds	67	35	32	--------
Deeds	71	12	59	--------
Rewards	3	4	--------	1
Designation of agents, foreign corporations	540	603	--------	63
Certificate of increase, capital stock	335	364	--------	29
Certificate of decrease, capital stock	228	182	46	--------
Certificate of increase, number of directors	157	271	--------	114
Certificate of decrease, number of directors	127	111	16	--------
Amended articles of incorporation filed	233	438	--------	205
Change of name of corporations	223	292	--------	69
Removal of place of business of corporations	139	229	--------	90
Dissolution of corporations	502	542	--------	40
Continuance of existence	9	17	--------	8
Withdrawals from state, foreign corporations	88	51	37	--------
Creation of bonded indebtedness	154	211	--------	62
Attested and Recorded.				
Restoration to citizenship	730	913	--------	183
Releases from prison (Goodwin Act)	2,002	1,819	183	--------
Commutations of sentence	27	16	11	--------
Pardons	35	46	--------	11
Reprieves	33	4	29	--------
Land patents	446	637	--------	191
Notaries public	3,910	4,182	--------	272
Commissioners of deeds	31	22	9	--------
Executive appointments	619	682	--------	63
Holiday and other proclamations	34	30	4	--------
Certificates provided for by section 1278, C. C. P.	--------	--------	--------	--------
Change of name of corporation	197	201	--------	4
Term of existence terminated by resolution	75	119	--------	41
Totals	16,195	19,724	426	3,955
		16,195		426
Decrease in last two years	--------	3,529	--------	3,529

Respectfully submitted.

FRANK C. JORDAN,
Secretary of State.

FINANCIAL STATEMENT.

CORPORATION DEPARTMENT.

RECEIPTS FOR FILING FEES, CERTIFIED COPIES, ETC.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.		*Sixty-seventh fiscal year July 1, 1915, to June 30, 1916.*	
July	$16,603 33	July	$11,551 90
August	19,428 74	August	9,622 38
September	12,170 66	September	9,009 35
October	24,094 78	October	9,540 48
November	14,065 76	November	25,127 21
December	15,599 78	December	8,243 35
January	14,472 05	January	9,595 04
February	11,476 18	February	12,166 80
March	20,457 58	March	11,535 54
April	14,560 44	April	20,115 14
May	12,766 68	May	12,303 03
June	10,150 03	June	17,611 63
Total	$185,846 01	Total	$156,421 85

Receipts sixty-sixth fiscal year	$185,846 01
Receipts sixty-seventh fiscal year	156,421 85
Total	$342,267 86

There was collected by the Corporation License Tax Department during the—

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915	$10,247 50
Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916	776,628 42
Total	$786,875 92

Receipts from all departments of the Secretary of State of fees during the sixty-sixth and sixty-seventh fiscal years:

From Corporation Department	$342,267 86
From Corporation License Tax Department	786,875 92
Total	$1,129,143 78

CORPORATION LICENSE DEPARTMENT.

The provisions of chapter 336, Statutes 1913, approved June 10, 1913, and chapter 190, Statutes 1915, approved May 10, 1915, produced the following revenues:

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.		*Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.*	
July	$1,010 00	July	$140 00
August	435 00	August	2,295 00
September	315 00	September	200 00
October	1,355 00	October	510 00
November	550 00	November	440 00
December	837 50	December	335 00
January	1,175 00	January	301,865 00
February	445 00	February	336,996 32
March	2,275 00	March	62,678 34
April	705 00	April	20,793 74
May	570 00	May	32,115 84
June	575 00	June	18,259 18
Total	$10,247 50	Total	$776,628 42

There was collected during the period commencing on July 1, 1914, and ending June 30, 1915, inclusive, the sum of $10,247.50, segregated as follows:

11 corporations paid the graduated tax and $10 penalty	$1,292 50
92 corporations paid the revivor license under section 2 of chapter 336, Statutes, 1913	8,955 00
Total	$10,247 50

On May 10, 1915, chapter 190, Statutes 1915, was approved. Under the act there was collected during the period commencing on July 1, 1915, and ending on June 30, 1916, inclusive, the sum of $776,628.42, segregated as follows:

14,141 corporations paid the graduated tax under section 4 in the sum of	$603,835 00
1,216 corporations paid the graduated tax and $10 penalty	69,970 00
1,021 corporations licenses were issued under the provisions of section 6	30,608 42
1,331 corporations paid the revivor license under section 14	72,215 00
Total for sixty-seventh fiscal year	$776,628 42

The number of domestic corporations which forfeited their charters, and of foreign corporations which forfeited their rights to transact business in this state, was 5,940.

BALLOT PAPER REVOLVING FUND.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

July 1, 1914—By balance		$9,025 49
June 30, 1915—By receipts		11,996 03
June 30, 1915—By transfers		4,557 54
June 30, 1915—To warrants	$18,496 26	
June 30, 1915—To balance	7,082 80	
		$25,579 06

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By balance		$7,082 80
June 30, 1916—By receipts		8,906 10
June 30, 1916—To warrants	$15,801 50	
June 30, 1916—To balance	187 40	
		$15,988 90

POSTAGE, EXPRESSAGE AND TELEGRAPHING.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

July 1, 1914—Balance on hand	$3,426 78
Appropriation	8,000 00
Credits	446 25
	$11,873 03
June 30, 1915—Amount expended during fiscal year	8,404 76
Balance on hand	$3,468 27

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By appropriation	$10,000 00
June 30, 1916—Amount expended during fiscal year	3,714 89
Balance on hand	$6,285 11

CONTINGENT AND TRAVELING—SECRETARY OF STATE'S OFFICE.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

July 1, 1914—By appropriation	$1,250 00
June 30, 1915—Expended during fiscal year	1,115 61
Balance on hand	$134 39

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By appropriation	$1,250 00
June 30, 1916—Expended during fiscal year	1,249 58
Balance on hand	42

SECRETARY OF STATE.

PRINTING, BINDING AND OTHER WORK.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

July 1, 1914—By appropriation	$10,000 00
June 30, 1915—Expended during fiscal year	3,138 76
Balance on hand	$6,861 24

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By appropriation	$9,000 00
June 30, 1916—Expended during fiscal year	1,679 45
Balance on hand	$7,320 55

CORPORATION LICENSE DEPARTMENT.

PRINTING, BINDING, ETC.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

July 1, 1914—By appropriation	$2,150 00
June 30, 1915—Amount expended during fiscal year	226 37
Balance on hand	$1,923 63

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By appropriation	$2,150 00
June 30, 1916—Amount expended during fiscal year	568 51
Balance on hand	$581 49

POSTAGE AND CONTINGENT.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

July 1, 1914—By appropriation	$1,250 00
June 30, 1915—Amount expended during fiscal year	632 90
Balance on hand	$617 10

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By appropriation	$1,250 00
Credit	37 08
	$1,287 08
June 30, 1916—Amount expended during fiscal year	1,265 51
Balance on hand	$21 57

PRINTING AND BINDING.

BLUE BOOK.

Sixty-fourth and sixty-sixth fiscal years, 1913-1915.

July 1, 1913—By appropriation	$5,000 00
June 30, 1915—Amount expended	4,306 49
Balance on hand	$693 51

COMPILING, PRINTING AND DISTRIBUTING CONSTITUTIONAL AMENDMENTS.

Chapter 345, Statutes 1915.

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By appropriation	$30,000 00
Credit	2 31
	$30,002 31
June 30, 1916—Expended during fiscal year	20,609 57
Balance on hand	$9,392 74

APPROPRIATION, OFFICE EQUIPMENT FOR ARCHIVES.

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—Appropriation	$3,500 00
June 30, 1916—Amount expended	3,421 57
Balance on hand	$78 43

INDEX TO LAWS.

	On hand July 1, 1914	Number distributed	On hand June 30, 1916
Index to Laws, 1850-1893	435	--------	435
Index to Laws, 1850-1907	880	5	875

TRANSACTIONS IN MAPS.

	On hand July 1, 1914	Number distributed	On hand June 30, 1916
Detail Irrigation Maps, Southern California	397	2	395
Detail Irrigation Maps, San Joaquin	1,196	1	1,195
Great Central Valley Maps, unmounted	1,866	3	1,863
Great Central Valley Maps, mounted	131	1	130
Topographical and Irrigation Maps, San Joaquin Valley, 4 sheets, mounted	27¼	2	25¼
Topographical and Irrigation Maps, San Joaquin Valley, 4 sheets, unmounted	496¾	3	493¾

BALLOT PAPER REVOLVING FUND.

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

July 1, 1914—By balance		$9,025 49
June 30, 1915—By receipts		11,996 03
June 30, 1915—By transfers		4,557 54
June 30, 1915—To warrants	$18,496 26	
June 30, 1915—To balance	7,082 80	
		$25,579 06

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

July 1, 1915—By balance		$7,082 80
June 30, 1916—By receipts		8,906 10
June 30, 1916—To warrants	$15,801 50	
June 30, 1916—To balance	187 40	
		$15,988 90

Sixty-sixth fiscal year, July 1, 1914, to June 30, 1915.

Ballot paper, 25 x 30, green.

July 1, 1914—On hand	2.00 reams
June 30, 1915—Sold	2.00 reams

Ballot paper, 22 x 44, blue.

July 1, 1914—On hand	1.00 ream
June 30, 1915—Sold	1.00 ream

Ballot paper, 22 x 44, yellow.

July 1, 1914—On hand	2.00 reams
June 30, 1915—Sold	2.00 reams

Ballot paper, 25 x 38, golden.

July 1, 1914—On hand	259.00	reams
June 30, 1915—Sold	178.00	reams
On hand June 30, 1915	81.00	reams

Ballot paper, 25 x 38, golden.

July 1, 1914—On hand	505.00	reams
June 30, 1915—Sold	505.00	reams

Ballot paper, 25 x 30, green.

July 1, 1914—On hand	143.00	reams
June 30, 1915—Sold	51.00	reams
On hand, June 30, 1915	92.00	reams

Ballot paper, 25 x 30, blue.

July 1, 1914—On hand	201.00	reams
June 30, 1915—Sold	92.00	reams
On hand, June 30, 1915	109.00	reams

Ballot paper, 25 x 30, pink.

July 1, 1915—On hand	146.95	reams
June 30, 1915—Sold	89.00	reams
On hand, June 30, 1915	57.95	reams

Ballot paper, 25 x 50, golden rod.

July 1, 1914—Purchased	800.00	reams
June 30, 1915—Sold	639.50	reams
On hand, June 30, 1915	160.50	reams

Ballot paper, 25 x 50, salmon.

July 7, 1914—Purchased	402.60	reams
June 30, 1915—Sold	332.60	reams
On hand, June 30, 1915	70.00	reams

Ballot paper, 25 x 50, green.

July 7, 1914—Purchased	623.45	reams
June 30, 1915—Sold	537.00	reams
On hand, June 30, 1915	86.45	reams

Ballot paper, 25 x 50, blue.

July 7, 1914—Purchased	207.25	reams
June 30, 1915—Sold	167.00	reams
On hand, June 30, 1915	40.25	reams

Ballot paper, 25 x 50, white.

July 7, 1914—Purchased	156.00	reams
June 30, 1915—Sold	134.00	reams
On hand, June 30, 1915	22.00	reams

Ballot paper, 25 x 50, pink.

July 7, 1914—Purchased	203.00	reams
June 30, 1915—Sold	137.00	reams
On hand, June 30, 1915	66.00	reams

Ballot paper, 25 x 40, cream.

Sept. 14, 1914—Purchased	2,217.00	reams
June 30, 1915—Sold	1,988.00	reams
On hand, June 30, 1916	229.00	reams

Ballot paper, 25 x 50, cream.

Sept. 23, 1914—Purchased	524.25 reams
June 30, 1915—Sold	520.25 reams
On hand, June 30, 1915	4.00 reams

Ballot paper, 40 x 50, cream.

Sept. 23, 1914—Purchased	672.00 reams
June 30, 1915—Sold	672.00 reams

Sixty-seventh fiscal year, July 1, 1915, to June 30, 1916.

Ballot paper, 22 x 44, blue.

July 1, 1915—On hand	1.00 ream
June 30, 1916—Sold	1.00 ream

Ballot paper, 25 x 38, golden.

July 1, 1915—On hand	81.00 reams
June 30, 1916—Sold	81.00 reams

Ballot paper, 25 x 30, green.

July 1, 1915—On hand	92.00 reams
June 30, 1916—Sold	27.00 reams
On hand, June 30, 1916	65.00 reams

Ballot paper, 25 x 30, blue.

July 1, 1915—On hand	109.00 reams
June 30, 1916—Sold	22.50 reams
On hand, June 30, 1916	86.50 reams

Ballot paper, 25 x 30, pink.

July 1, 1915—On hand	57.95 reams
June 30, 1916—Sold	57.95 reams

Ballot paper, 25 x 50, golden rod.

July 1, 1915—On hand	160.50 reams
June 30, 1916—Sold	55.50 reams
On hand, June 30, 1916	105.00 reams

Ballot paper, 25 x 50, salmon.

July 1, 1915—On hand	71.50 reams
June 30, 1916—Sold	43.50 reams
On hand, June 30, 1916	28.00 reams

Ballot paper, 25 x 50, green.

July 1, 1915—On hand	86.45 reams
June 30, 1916—Sold	42.00 reams
On hand, June 30, 1916	44.45 reams

Ballot paper, 25 x 50, blue.

July 1, 1915—On hand	40.00 reams
June 30, 1916—Sold	16.00 reams
On hand, June 30, 1916	24.00 reams

Ballot paper, 25 x 50, white.

July 1, 1915—On hand	22.00 reams
June 30, 1916—Sold	21.00 reams
On hand, June 30, 1916	1.00 ream

Ballot paper, 25 x 50, pink.

July 1, 1915—On hand	66.00 reams
June 30, 1916—Sold	27.00 reams
On hand, June 30, 1916	39.00 reams

Ballot paper, 25 x 40, cream.

July 1, 1915—On hand	229.00 reams
June 30, 1916—Sold	200.00 reams
On hand, June 30, 1916	29.00 reams

Ballot paper, 25 x 50, cream.

June 30, 1915—On hand	4.00 reams
On hand, June 30, 1916	4.00 reams

Ballot paper, 25 x 30, blue.

Aug. 19. 1915—Purchased	432.90 reams
On hand, June 30, 1916	432.90 reams

Ballot paper, 25 x 30, cream.

Aug. 23, 1915—Purchased	1,521.50 reams
June 30, 1916—Sold	805.00 reams
On hand, June 30, 1916	716.50 reams

Ballot paper, 35 x 38, cream.
(In three ream bundles.)

Mar. 8, 1916—Purchased	947.80 reams
June 30, 1916—Sold	453.00 reams
On hand, June 30, 1916	494.80 reams

Ballot paper, 35 x 38, cream.
(In two ream bundles.)

Mar. 8, 1916—Purchased	60.00 reams
June 30, 1916—Sold	28.00 reams
On hand, June 30, 1916	32.00 reams

Ballot paper, 35 x 38, cream.
(In one ream bundles.)

Mar. 8. 1916—Purchased	30.00 reams
June 30, 1916—Sold	12.00 reams
On hand, June 30, 1916	18.00 reams

Ballot paper, 22 x 30, light green.
(In four ream bundles.)

Mar. 8, 1916—Purchased	631.65 reams
June 30, 1916—Sold	300.00 reams
On hand, June 30, 1916	331.65 reams

Ballot paper, 22 x 30, light green.
(In two ream bundles.)

Mar. 8, 1916—Purchased	60.00 reams
June 30, 1916—Sold	28.00 reams
On hand, June 30, 1916	32.00 reams

Ballot paper, 22 x 30, light green.
(In one ream bundles.)

Mar. 8, 1916—Purchased	30.00 reams
June 30, 1916—Sold	7.00 reams
On hand, June 30, 1916	23.00 reams

Ballot paper, 20 x 30, blue.
(In four ream bundles.)

Mar. 8, 1916—Purchased	663.60 reams
June 30, 1916—Sold	359.00 reams
On hand, June 30, 1916	304.60 reams

Ballot paper, 20 x 30, blue.
(In two ream bundles.)

Mar. 8, 1916—Purchased	60.00 reams
June 30, 1916—Sold	28.00 reams
On hand, June 30, 1916	32.00 reams

Ballot paper, 20 x 30, blue.
(In one ream bundles.)

Mar. 8, 1916—Purchased	30.00 reams
June 30, 1916—Sold	8.00 reams
On hand, June 30, 1916	22.00 reams

Ballot paper, 25 x 36, white.
(In two ream bundles.)

Mar. 8, 1916—Purchased	45.80 reams
On hand, June 30, 1916	45.80 reams

Ballot paper, 35 x 36, white.
(In one ream bundles.)

Mar. 8, 1916—Purchased	30.00 reams
On hand, June 30, 1916	30.00 reams

STATUTES AND LAWS.

Number Distributed and Number on Hand.

	On hand July 1, 1914	Number distributed	On hand June 30, 1916
Statutes, 1855	2	--------	2
Statutes, 1856	4	--------	4
Statutes, 1859	2	--------	2
Statutes, 1863-4	2	--------	2
Statutes, 1875-6	271	6	265
Statutes, 1877-8	212	4	208
Statutes, 1880	88	4	84
Statutes, 1881	201	6	195
Statutes, 1883	67	6	61
Statutes, 1886-7	112	4	108
Statutes, 1891	1	0	1
Statutes, 1893	70	4	66
Statutes, 1897	37	5	32
Statutes, 1899	299	5	294
Statutes, 1901	171	7	164
Statutes, 1903	158	6	152
Statutes, 1905	130	5	125
Statutes, 1907	201	6	195
Statutes, 1909	228	9	219
Statutes, 1911	121	30	91
Statutes, 1912	540	17	523
Statutes, 1913	82	52	30
Statutes, 1915	2,250	2,127	123
Statutes continued in force, 1873	107	6	101
Amendments to Codes, 1875-6	286	--------	286
Amendments to Codes, 1877-8	267	--------	267
Amendments to Codes, 1880	120	--------	120
Amendments to Codes, 1873-4	23	--------	23
Civil Code, Annotated, 1874	4	--------	4
Civil Code, California, 1871	3	--------	3
California Codes, Practice No. 3, 1871	7	--------	7
California Codes, Political No. 2, 1872	42	--------	42
California Codes, Political, 1872	--------	--------	--------
California Codes, Civil Procedure, 1872	238	--------	238
California Codes, Penal, 1872	6	--------	6
California Codes, Penal, 1871-2	4	--------	4
California Codes, Civil Procedure, 1881-3	13	--------	13
California Codes, Penal (Pocket) 1881-3	19	--------	19
Wood's Digest, 1850-1858	1	--------	1
Wood's Digest, 1850-1860	1	--------	1
Hittell's Codes, Volume 1, 1876	25	--------	25
Hittell's Codes, Volume 2, 1876	23	--------	23
General Laws of California, 1850-1864	1	--------	1

SUPREME COURT REPORTS.

	On hand July 1, 1914	Number distributed	On hand June 30, 1916
California Reports No. 41	398	6	392
California Reports No. 42	419	6	413
California Reports No. 43	439	6	433
California Reports No. 44	384	6	378
California Reports No. 45	410	6	404
California Reports No. 46	694	6	688
California Reports No. 165	406	406	--------
California Reports No. 166	406	406	--------
California Reports No. 167	406	406	--------
California Reports No. 168	409	409	--------
California Reports No. 169	409	409	--------
California Reports No. 170	409	409	--------

CALIFORNIA REPORTS—APPELLATE COURT.

	On hand July 1, 1914	Number distributed	On hand June 30, 1916
Decisions of Appellate Court No. 22	406	--------	406
Decisions of Appellate Court No. 23	406	--------	406
Decisions of Appellate Court No. 24	406	--------	406
Decisions of Appellate Court No. 25	409	--------	409
Decisions of Appellate Court No. 26	409	--------	409
Decisions of Appellate Court No. 27	409	--------	409
Decisions of Appellate Court No. 28	409	--------	409

FRANK C. JORDAN,
Secretary of State.

Subscribed and sworn before me this 14th day of August, 1916.

FRANK H. CORY,
Deputy Secretary of State.

o

REPORT

OF THE

California State Board of Equalization

FOR

1915-1916

STATE BOARD OF EQUALIZATION

JOHN C. CORBETT, First District
JOHN MITCHELL, Second District
R. E. COLLINS, Third District, Chairman
JEFF McELVAINE, Fourth District
JOHN S. CHAMBERS, Controller
T. M. EBY, Secretary

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO
1916

26479

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REPORT OF THE STATE BOARD OF EQUALIZATION.

To His Excellency HIRAM W. JOHNSON,

Governor.

SIR: In compliance with law the State Board of Equalization submits the following report covering the assessment years 1915 and 1916:

State Assessment Roll.

The assessment of property for county purposes, known as the nonoperative property, increased $123,984,644 in 1916 over the preceding assessment, or from $2,791,893,777 in 1915 to $2,915,878,421 in 1916. This increase in assessed values is distributed as follows:

Real estate	$103,121,024
Improvements	6,613,984
Personal property	12,949,330
Money and solvent credits	1,300,306

Of the increase shown in the assessment of real estate over $93,000,000 of the amount is assigned to Los Angeles County. Prior to and during the 1916 assessment Los Angeles County had appraisers at work assisting the county assessor in the work of appraising real estate and, to some extent, improvements. The work was systematically taken up and very thoroughly gone into, with the result that the nonoperative real estate assessment was increased from $440,390,555 to $533,617,675. The assessed value of improvements, however, decreased from $175,459,990 to $169,883,825.

The assessment of the operative property—otherwise the property belonging to public utilities—as assessed by the county assessors, increased $143,516,626. The principal increase in this class of property is assigned to the fact that the city and county of San Francisco in 1916 added over one hundred millions to its operative roll by assessing the franchises of the common or closed corporations not heretofore assessed. Los Angeles also increased the operative roll by nearly forty millions. In fact, nearly every county in the state increased the assessments of the operative property to some extent.

New Appraisement Law.

The legislature of 1915 enacted a statute authorizing the boards of supervisors to appoint appraisers to assist the assessor in appraising property for assessment purposes. So far but very few of the counties have seen fit to take advantage of this very salutary provision. While in a large county, where the real estate is varied as to use and occupation, the expense of appraising is no doubt great, yet it stands to reason that if the work is well done the county will be reimbursed for the outlay from the first collection of taxes under the new appraisement. While under the present system of maintaining the state government the state is not vitally interested in the assessment of nonoperative property, yet we sincerely hope more of the counties will awake to the possibilities under the new statute and proceed to act under it. It certainly is along the line of better and more equitable assessment.

Moreover, a fair appraisement of the property situate within the limits of municipalities would most likely increase the value to such extent that it could well form the basis for municipal taxation instead of having two separate assessments as at present.

Again, we are not unmindful of the fact that increased assessments pave the way for an increase of taxes to be paid, but we attribute common honesty to the supervisors or other tax-fixing authorities, and utter our belief that with a largely increased assessment roll there would still be a tendency to keep the tax rate down to the lowest notch consistent with the needs of a growing county or city. At any rate the experiment with appraisement is well worth a trial.

Railroad Assessments.

The assessment by this board of the franchise, roadway, roadbed, rails and rolling stock of railroads operated in more than one county was increased $2,070,954. A table showing such assessment is set forth in the appendix.

Veterans' Exemption.

The assessed value of property exempted under the "veterans' exemption" ratified in 1911 continues each year in relatively the same amount:

	Number of claimants	Value of exemptions
1912	10,692	$7,220,992
1913	13,902	8,868,302
1914	14,989	10,180,506
1915	15,647	10,942,175
1916	16,459	9,451,574

A table showing exemptions by counties for the years 1915 and 1916 is contained in the appendix.

More Exemptions.

Since our last report two more classes of property have been exempted from taxation by a vote of the people. At the general election held in November, 1914, two sections were added to Article XIII of the constitution, numbered sections 1*a* and 4, providing as follows:

> Sec. 1*a*. Any educational institution of collegiate grade, within the state of California, not conducted for profit, shall hold exempt from taxation its buildings and equipment, its grounds within which its buildings are located, not exceeding one hundred acres in area, its securities and income used exclusively for the purposes of education.
>
> Sec. 4. All vessels of more than fifty tons burden registered at any port in this state and engaged in the transportation of freight or passengers, shall be exempt from taxation except for state purposes, until and including the first day of January, nineteen hundred thirty-five.

Under the college exemption amendment assessed values have been exempted as follows:

College Exemptions.

	1915	1916
Alameda County.		
Mills College	$58,700	$116,150
St. Mary's College (Oakland)	92,925	90,000
St. Mary's College (Albany)	24,800	24,800
Pacific Theological Seminary (Oakland)	--------	21,500
Oakland College of Medicine and Surgery (Oakland)	--------	8,325
Los Angeles County.		
University of Southern California	54,360	75,790
College of Dentistry, U. S. C.	25,800	34,495
Santa Clara College	10,245	12,660
Throop College of Technology	91,225	92,570
Occidental College	157,335	226,040
Whittier College	13,560	11,140
Nazarene University	57,595	55,480
Pomona College	62,780	184,390
Lordsburg College	--------	17,985
Southwestern University	--------	1,345
University of California	--------	41,030
Marin County.		
San Francisco Theological Seminary	--------	43,800
San Bernardino County.		
College of Medical Evangelists	64,245	65,140
University of Redlands	33,250	32,750
City and County of San Francisco.		
St. Ignatius College	50,090	47,090
Leland Stanford Junior University	154,440	164,440
Santa Clara County.		
Leland Stanford Junior University	10,800	10,800
Santa Clara College	155,470	155,470
College of the Pacific	46.950	47.500
College of Notre Dame	165,175	171,240
Total college exemptions	$1,329,745	$1,751,920

Shipping Exemption.

Under the shipping amendment, vessels heretofore carried on the assessment rolls at about eight million dollars were lost from the rolls, nearly the entire amount being upon the assessment roll of the city and county of San Francisco. About seven counties only were affected by the amendment.

Assessment of Motor Vehicles.

From the reports made to this board it appears that for the assessment year 1916 there were 127,051 motor vehicles assessed on the county rolls at a total assessed value of $32,949,924, or an average of $259 for each motor vehicle. It is probable that an assessment for at least an equal amount also appears on the rolls of the several municipalities.

Under the new motor vehicle license law, passed in 1915, all of these machines are required to pay the state an annual license tax graded according to the power and ranging from $8.80 to $25.00. It would seem that this class of property, in a measure, is bearing a tax disproportionate to other classes of property assessed.

If the incoming legislature is to submit to the people any constitutional provisions revising the existing law relating to what property is subject to assessment, we suggest that it embody a provision exempting auto vehicles from local taxation.

The Jitney Question.

We desire again to call attention to the loss of revenue to the state by reason of the operation of automobiles and autobus lines in competition, as common carriers, with the steam and electric lines throughout the state.

In November, 1910, at the time of the adoption of the amendment (No. 1) to the constitution providing for the taxation of public service corporations on the basis of their gross receipts, the automobile was practically an unknown factor in the public utility field. During the past two and one-half years, however, the automobile has developed into a definite and permanently established public utility for the transportation of freight and passengers in competition with the steam and electric railroads of the state. During this period this class of utility has made great inroads on the earnings formerly enjoyed by the steam and electric railroads, and this loss of revenue to the roads has resulted, in turn, in a corresponding loss of revenue to the state.

It was estimated in our 1914 report that the steam and electric lines lost $2,500,000 as a direct result of the competition of the so-called jitney and autobus, and figures compiled by the lines for the year 1915 place their loss as a result of the same cause at $4,469,688. From information received from the steam and electric lines the indications are that their losses in revenue in this respect will be greater for the year 1916 than for 1915, and this is particularly true of the passenger earnings of a number of lines which report that the autobus competition is steadily increasing.

The steam lines having their termini in San Francisco bay district showed a very considerable increase in gross receipts for the year 1915, as compared with 1914, which they attribute largely to the Exposition travel and the unprecedented movement of freight over the entire country; while, with the exception of a few lines not having jitney and autobus competition, the electric lines throughout the state suffered decreases in their gross receipts for the same period. The comparative gain and loss of the steam and electric lines for the two years is best illustrated by the following figures, which represent the gross taxable receipts of several of the principal steam and electric lines for the two periods:

	1914 taxable receipts	1915 taxable receipts	Increase+ Decrease−
Steam Lines.			
Southern Pacific Company	$58,059,423 08	$63,116,823 53	+$5,057,400 45
Atchison, Topeka and Santa Fe Railway	18,196,324 46	19,340,859 96	+ 1,144,535 50
Northwestern Pacific Railroad Co.	3,733,204 53	3,982,513 38	+ 249,308 85
San Pedro, Los Angeles and Salt Lake Railroad	3,730,798 00	3,622,385 00	— 108,413 00
San Diego and Southeastern Railroad	361,745 52	277,425 57	— 84,319 95
Western Pacific Railroad	2,602,908 36	2,943,127 23	+ 340,218 87
Yosemite Valley Railroad	281,080 19	442,141 55	+ 161,061 36
Mt. Tamalpais and Muir Woods Railway	56,201 95	178,344 36	+ 122,142 41
Electric Lines.			
Bakersfield and Kern Electric Railway	95,060 18	47,603 20	— 47,456 98
Central California Traction Company	339,957 73	279,271 99	— 60,685 74
Fresno Traction Company	237,294 26	227,816 85	— 9,387 41
Humboldt Transit Company	90,472 82	77,994 37	— 12,478 45
Los Angeles Railway	6,725,207 46	6,081,385 79	— 643,821 67
Northern Electric Railway	817,905 32	791,096 75	— 26,808 56
Pacific Electric Railway	8,803,109 35	8,786,866 62	— 16,242 73
Sacramento Street Railway	556,908 00	425,337 97	— 131,570 03
Peninsular Railway	301,066 94	286,347 19	— 14,719 75
San Francisco-Oakland Terminal Railways	4,612,364 78	4,616,625 85	+ 4,261 07
San Jose Railroads	352,381 09	336,473 57	— 15,907 52
Tidewater Southern Railway	95,238 50	83,387 84	— 11,850 66
United Railroads of San Francisco	8,379,786 76	7,998,842 78	— 380,943 98
Visalia Electric Railroad	102,732 96	85,864 05	— 16,868 91

The total taxable gross receipts of the steam and electric lines for the year ending December 31, 1915, amounted to $130,706,884.29, as against $125,358,630.31 for the corresponding year 1914, an increase of $5,348,253.98. The extraordinary condition prevailing in 1915 was therefore responsible for the increase in the taxable gross receipts of the steam lines. From the advanced information we have received, the indications are that the 1916 earnings will show a small increase as compared with 1915 earnings.

As a further clarification of the matter of loss of earnings, a short table giving a shrinkage in the earnings of some of the smaller roads will not be amiss. The table following relates to *passenger earnings* only. The receipts are for the calendar years ending December 31st respectively:

Passenger Earnings.

	1912	1913	1914	1915
Bakersfield and Kern Electric	$110.842	$106.664	$94,120	$46,906
Central California Traction	251.167	261,052	253,514	190,300
Colusa and Lake	10.877	8,476	6,079	Finis
Fresno Traction	193,211	222,285	235,433	223,869
Humboldt Transit	85,975	87,480	90,386	77,946
Los Angeles and San Diego Beach	69,865	68,045	55,305	65.803
Los Angeles Railway	6,479,694	6,927,046	6,658,243	6,014.229
McCloud River	20,579	23,105	20,169	15,546
Modesto Interurban	5,668	5,460	4,661	3,779
Monterey and Pacific Grove	42.900	41,813	35,631	32,449
Mt. Tamalpais and Muir Woods	70,359	63,067	56,201	178,306
Nevada-California-Oregon	133,561	76,649	95,136	90,391
Nevada County Narrow Gauge	54,212	61,027	55,166	56,743
Northern Electric	397,384	537,683	527,275	477,385
Ocean Shore	85,348	85,452	85,954	68,022
Pacific Electric	7,015,732	7,526.379	7,013,883	6,967,416
Pacific Gas and Electric (Sacramento)	540,830	570,046	553,748	422.734
Peninsular Railway	237,446	241,469	250,571	241,207
Point Loma	29,832	60,659	45,129	39,597
Quincy Western	5,535	5,309	5,642	5,226
San Diego and Southeastern	185,320	147,559	124,673	130,746
San Diego Electric	859,526	1,001,314	930,089	992,552
San Francisco-Oakland Terminal	4,340,960	4,446,977	4,336,455	4,330,445
San Jose Railroads	339,964	347,508	337,439	322,975
Sierra Railway of California	102,736	103,935	105,713	71,871
Stockton Electric	183,591	197,225	206,756	203,346
Stockton Terminal and Eastern	5,759	6,120	6,828	4,678
Tidewater and Southern	2,607	9,406	62,025	47,844
Union Traction	88,750	80,702	72,596	60,017
United Railroads of San Francisco	8,426,354	8,503,401	8,313,041	7,939,907
Visalia Electric	54,197	49,946	43,024	33,688
Yreka Railroad	16,175	13,397	8,732	5,038

It is not intended by the above table to say that the entire shrinkage in passenger earnings of the specified roads is to be attributed entirely to the operation of jitneys. Much of the decrease can, of course, be allotted to the privately-owned autos and other vehicles. Competition with other roads is also a factor. But there is no doubt that a high percentage of the decline in earnings is traceable directly to the jitneys.

Take, for instance, the United Railroads and the San Francisco-Oakland Terminal Railways, each operating a direct line or lines to the Exposition grounds in San Francisco during the entire year 1915, each showing a decrease in earnings in 1915 over 1914, when as a matter of fact a handsome increase should have been shown. It is admitted, of course, that the municipal railway with direct lines to the fair grounds tended to cut down the earnings of other transportation companies to a very considerable extent, but the loss, to a marked degree, must be assigned to the jitneys and autobusses. In fact, the United Railroads estimates its loss in 1915 by the jitneys and autobusses alone at one million dollars, and the Key Route system estimates a loss of four hundred thousand dollars along the same line.

Finally, as an exhibit in this jitney question, we submit herewith a table showing the estimated loss of revenue to several roads. These estimates were made upon a written request of this board and refer to loss of revenue in the year 1915. Many of the estimates are based upon actual observation and count of the carrying capacity of the jitneys and autobusses. Privately-owned vehicles do not enter into these figures except perhaps to a very minor extent.

Jitney Loss, Year 1915.*

Amador Central	$3,000
Atchison, Topeka and Santa Fe	335,000
Bakersfield & Kern	50,000
Central California Traction	52,214
Glendale and Montrose	6,570
Holton Interurban	40,000
Humboldt Transit	19,000
Lake Tahoe	1,600
Los Angeles and San Diego Beach	7,900
Los Angeles Railway	500,000
Monterey and Pacific Grove	1,640
Nevada County Narrow Gauge	5,350
Nevada County Traction	1,242
Northern Electric	30,000
Northwestern Pacific	40,000
Ocean Shore	19,095
Pacific Coast	24,000
Pacific Electric	454,360
Pacific Gas & Electric (Sacramento)	100,000
Pajaro Valley Consolidated	360
Peninsular Railway	12,350
San Diego and Southeastern	150,000
San Diego Electric and Point Loma	210,000
San Francisco-Oakland Terminal Railways	400,000
San Jose Railroads	4,700
San Pedro, Los Angeles and Salt Lake	82,500
Santa Barbara and Suburban	8,000
Sierra Railway of California	50,000
Southern Pacific Company (passenger only)	500,000
South San Francisco Railroad and Power	1,800
Stockton Electric	10,000
Stockton Terminal and Eastern	4,200
Sunset Railway	43,200
Tidewater Southern	40,000
United Railroads of San Francisco	1,000,000
Ventura County Railway	1,607
Visalia Electric	35,000
Wells, Fargo & Co.	180,000
Yosemite Valley	40,000
Yreka Railroad	5,000
	$4,469,688

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*In some instances includes freight.

From the point of view of state revenue, this board considers this a serious situation, and urgently recommends that legislation be enacted to provide a tax on the class of utility referred to sufficient to reimburse the state for its losses. To classify this form of utility under the state tax law would require an amendment to the constitution, but there should be no difficulty in arriving at a figure in the way of a license tax, based on the average earnings or seating capacity that would be the equivalent of the tax paid by the steam and electric lines.

Loss of Revenue by Municipal Ownership.

The loss of revenue to the state from municipal ownership of public utilities was commented upon in our last report. There seems to be no reason in equity why the municipally-owned utility should not bear its just proportion of a state tax. If the separation law is to continue it should not be permissible for the state's political subdivisions to undermine the law by reaching in and pulling out some of the main props.

It must be remembered that the constitutional provision under which the state is collecting its principal revenue from taxation has a provision that if at any time the revenues derived under the present system (and receipts from all other sources) prove inadequate to maintain the state government, then and in that event a general deficiency tax ad valorem shall be levied upon all of the property in the state sufficient to meet such deficiency.

We state the proposition, therefore, that it is manifestly unfair for San Francisco and Los Angeles, or any other subdivision of the state, to take over a public utility taxed solely for state purposes without paying to the state the amount of taxes which would ordinarily accrue under private ownership. To do so creates a great liability for a deficiency in the state's revenues, and if resort is had to an ad valorem deficiency tax an unwarranted burden is cast upon the people of the state who do not live in the cities concerned.

We recommend the enactment of a law by which the municipalities owning and operating public utilities shall be required to report to this board and pay a tax commensurate with the state's other taxpayers.

United States Estate Tax.

Another source of eventual probable loss of state revenue is in the federal act providing an "estate tax" as pitted against the California inheritance tax. This matter, however, will no doubt receive full attention at the hands of the State Controller in his report.

Number of Corporations Assessed.

There were 2,371 less corporations assessed on the state assessment roll in 1916 than in the preceding year. This drop in number may be attributed to three principal causes: First, the reenactment of the state license tax, graduated considerably higher in amounts than has been the policy heretofore pursued by the state. In round numbers 5,000 corporations forfeited their charters for the nonpayment of this tax. It may be here added that about 1,600 have since revived and restored their charters; second, since the enactment of the so-called blue-sky law, and other regulatory measures, there has been a decided falling off in the number of domestic or California corporations being created, there being in 1915 about 1,100 less than in 1914; third, voluntary dissolution on completion of business for which the corporation was created.

The number of corporations assessed in the past two years was as follows:

	1915	1916
Railroads and street railways	152	134
Light, heat and power	179	167
Telephone and telegraph	170	159
Car companies	9	9
Express companies	3	3
Insurance companies	340	317
Banks	765	736
Mining companies	1,204	1,012
Oil companies	863	743
Water companies	1,040	980
Building and loan	97	93
General corporations	17,172	15,270
	21,994	19,623

Comparison of Old and New Tax Systems.

In the preceding six years (1911–1916) the common forms of property—real estate, improvements and personal property—have not been called upon to contribute one cent to maintain the state government in any of its many functions. And this notwithstanding the fact that many new governmental functions and policies have been assumed by the state in the last six years, involving a very considerable increase in state expenditures.

Under the old ad valorem system of assessment which was in use prior to the year 1911, the state's chief source of revenue was from taxation of all classes of property. Annually the state collected from this source, in round numbers, about eight millions of dollars:

1905	$7,957,724 44
1906	7,588,580 19
1907	8,365,815 94
1908	7,960,935 84
1909	8,879,813 29
1910	8,376,297 69

NOTE.—These amounts are taken from the reports of the State Controller.

At every recurring session of the legislature a cry goes up that the adoption of the new commutated tax system was a mistake; that it is inequitable; that the system has broken down; that it does not and will not afford the necessary revenue for running the state. Many other maledictions are hurled against the system, and the denouncing is not confined to legislative sources alone but was and is participated in by others prominent in the fiscal affairs of the state.

The first year of the new law (1911) gave us over *two millions of dollars* more revenue from taxation at the original corporate tax rates than was collected the last year (1910) under the ad valorem system, and which required 35.3 cents on every hundred dollars of taxable property to raise.

But of this two million dollars excess revenue approximately one million represented refunds and reimbursements to counties and cities because of the withdrawal of public utility properties from local taxation. In other words, the state merely acted as an agent, collecting the money and handing it over to the subdivisions. Therefore, this amount is not properly chargeable against the state.

The new tax system from the beginning has proved a fine revenue producer. It not only has met requirements, but in conjunction with other, though minor, sources of revenue has developed a surplus. It is working very smoothly. Business has now adjusted itself to this method of taxation and a very satisfactory condition exists.

What this law has accomplished is shown by the following table:

	1911	1912	1913	1914	1915	1916
Railroads, including street railways	$4,776,203 58	$4,941,224 70	$6,255,664 08	$6,317,675 16	$6,581,327 02	$6,862,111 44
Gas and electric	1,224,767 34	1,364,700 06	1,721,319 58	1,941,326 48	2,278,590 38	2,441,513 16
Telegraph and telephone	424,799 94	486,242 98	640,184 98	708,504 74	787,215 46	861,829 24
Car companies	89,262 02	91,292 74	125,109 40	124,614 16	122,761 52	169,567 16
Express	102,351 70	104,458 82	112,745 92	107,755 74	78,295 64	84,186 36
National banks	834,708 02	872,903 50	914,646 16	945,920 76	1,153,442 56	1,169,719 38
State banks	803,938 18	828,480 04	863,672 34	885,823 86	1,074,702 18	1,066,204 48
Insurance	520,214 68	602,204 88	762,704 34	816,096 54	1,022,455 96	1,065,272 32
General corporations	1,106,845 00	1,143,860 00	1,106,210 00	1,140,810 00	1,337,897 00	1,308,984 00
Oil corporations	346,359 00	300,800 00	291,085 00	445,155 00	410,034 00	451,968 00
Water corporations	119,441 00	94,180 00	89,610 00	95,660 00	104,469 00	103,593 00
Mining corporations	94,650 00	80,145 00	74,895 00	66,310 00	69,870 00	74,889 00
Building and loan companies	10,675 00	11,913 00	13,695 00	14,011 00	17,295 00	18,363 00
Totals	$10,454,215 46	$10,922,405 72	$12,971,541 80	$13,609,663 44	$15,038,355 72	$15,678,200 54

Small Delinquencies in Tax Payments.

As a wise precaution the framers of the new state tax law inserted in the constitution a provision that:

> "No injunction shall ever issue in any suit, action or proceeding in any court against this state or against any officer thereof to prevent or enjoin the collection of any tax levied under the provisions of this section; but after payment action may be maintained to recover any tax illegally collected in such manner and at such time as may now or hereafter be provided by law."

In consequence, the showing of delinquency of taxes levied against the public utilities, banks and insurance companies in five completed years is fairly negligible, as shown by the following summary:

Delinquent Taxes and Penalties.

	Total taxes levied—1911-1915, inclusive	Delinquent taxes and penalties					
		1911	1912	1913	1914	1915	Total delinquency
Railroads	$28,872,094 54				$55 84	$23 63	$79 47
Gas and electric	8,530,703 84		$90 00	$113 85	93 15	2,113 29	2,410 29
Telephone and telegraph	3,046,948 10			95 17	14 18	21 51	130 86
Car	553,039 84						
Express	505,607 82						
Insurance	3,723,676 40	$471 13	13 68	2,454 24	859 79	3,316 45	7,115 29
National banks	4,721,621 00						
State banks	4,456,616 60	12,652 63	16,294 84	14,363 72	6,026 36	6,417 79	55,755 34
Totals	$54,410,308 14	$13,123 76	$16,398 52	$17,026 98	$7,049 32	$11,892 67	$65,491 25

As stated in our last report, almost the entire amount of delinquency of the state banks may be charged to banks being liquidated by the state bank commissioner. It is extremely doubtful if the state is ever able to collect these bank delinquencies.

Eliminating these insolvent banks, we have the splendid showing of only about ten thousand dollars uncollected in a levy of near fifty-five million dollars. Could any tax law operate to better effect in this respect?

Estimate of Tax Receipts, Sixty-ninth and Seventieth Fiscal Years.

To the end that the Governor and legislature might have before them the latest information relative to revenues, this board sought from the public service utilities an estimate of gross taxable receipts for the year ending December 31, 1916, and which would show approximately the amount of revenue from taxation available for the sixty-ninth fiscal year ending June 30, 1918.

We are agreeably surprised to learn that the public utilities estimate their receipts will be slightly in advance over those received for the calendar year 1915. Owing to the heavy increase in traffic, both freight and passenger, which would naturally flow by reason of the World's Fair held in San Francisco in 1915, the prevailing opinion was that the utility receipts in 1916 would show quite a heavy decrease.

As to the estimate of taxes from the banks, insurance companies and general corporate franchises, we of course have no means of estimating the increase or decrease from these sources. We are compelled, therefore, to adopt as our estimates the actual showing for the year 1915.

Our estimate of taxes available for the sixty-ninth and seventieth fiscal years is as follows:

	Sixty-eighth fiscal year, actual	Sixty-ninth and seventieth fiscal years, estimated
Railroads, including street railways	$6,862,112 00	$7,007,575 00
Gas and electric	2,441,513 00	2,550,508 00
Telephone and telegraph	861,829 00	890,366 00
Car companies	169,567 00	129,050 00
Express companies	84,186 00	93,805 00
Insurance companies	1,065,272 00	1,065,272 00
National banks	1,169,719 00	1,169,719 00
State banks	1,066,205 00	1,066,205 00
General franchises	1,957,797 00	1,957,797 00
Totals	$15,678,200 00	$15,930,297 00

The table shows an estimated increase from taxes of about a quarter of a million dollars.

As to estimated receipts from sources other than taxation, reference should be had to the report of the state controller. Such receipts will be in the neighborhood of $4,780,500.

Decisions Affecting New Tax System.

County of San Bernardino vs. *State Board of Equalization.* Supreme Court. Decided February 8, 1916.

Involved in the action was the question as to whether a precooling plant together with the ice manufacturing plant, repair shop and connecting tracks, were "operative property" of the Pacific Fruit Express Company, a "car company," taxed on its gross receipts from operation under the new commutated tax system. Held, that the property was operative and not subject to local taxation.

Southern Pacific Company vs. *Levee District No. 1 of Sutter County.* Supreme Court. Decided March 8, 1916.

Involved was the question whether the railroad company should be required to pay the levee district tax and also to pay the state the entire tax based upon a percentage of its gross receipts without permitting the company to deduct such district payment from the total state tax; or whether the state, under the bond reimbursement clause of the constitution, should pay the district tax out of the total tax paid by the railroad, as aforesaid. Held, that under a full and fair interpretation of all of the provisions of the constitutional provisions relating to the commutated tax system, the levee district was one of the state's political subdivisions which were to be reimbursed for bond taxes, notwithstanding the oft repeated phrase contained in the constitutional tax provision that the payment to the state by a public utility of a percentage of its gross receipts "shall be in lieu of all other taxes * * * *state, county, and municipal,* upon the property of" the public utility so taxed. Held, further, that it was the duty of the state to pay the tax to the district.

The People vs. *Bank of Shasta County.* Supreme Court. Decided April 24, 1916.

The bank was in liquidation, having been taken over by the State Bank Commissioner for that purpose. While a bank, as a going concern, is to be taxed upon the "book value" of its stock (such book value being the amount paid in on the stock, plus the surplus and undivided profits), yet the value of a share of stock in a bank in liquidation is to be its pro rata of the actual assets of the bank. As to the litigated bank, the court found that the liabilities exceeded the assets and that the shares of stock possessed no taxable value, and that therefore the state tax was without warrant in law. Under this decision it is highly improbable that the state will be able to reap much, if any, taxes from banks in liquidation.

Bank of California National Association vs. *Roberts, State Treasurer.* Supreme Court. Decided September 21, 1916.

Involved what was claimed to be "double taxation." The Bank of California owns a majority of the shares of stock of the National Bank of D. O. Mills & Co. (Sacramento), and of the Mission Bank (a domestic savings bank in San Francisco). The tax was levied upon the book value of the shares in each of the three banks, without allowing the Bank of California a deduction for the shares held in the other two banks. In its claim of double taxation the bank relied upon a line of cases decided by the California Supreme Court prior to the amendment of section one of article thirteen of the constitution and the addition thereto of section fourteen of said article, constituting the present scheme of state taxation. Held, that the former decisions on double taxation were not applicable under the existing tax law; that if an apparent double tax had been levied upon such shares of stock of the Bank of California, it was warranted by the constitutional provisions providing the new method of taxing banks, and that such new method was not in conflict with the law laid down by congress for taxing national banks. The state received the judgment by a reversal of the lower court.

Insurance Suits.

The actions which were commenced by several mutual life insurance companies against the state to recover taxes, in which actions Hon. John W. Stetson is representing the state, remain about the same as shown in our last report, with the exception that the actions brought by the Northwestern Mutual and the Massachusetts Mutual were decided by the superior court in favor of the state and are now on appeal to the Supreme Court of the state. The taxes involved in the several actions total $388,211.31. The status of the actions is shown by the following exhibit:

TABLE OF ACTIONS COMMENCED IN SUPERIOR COURT, SAN FRANCISCO, AGAINST THE STATE TREASURER. TO RECOVER TAXES PAID BY LIFE INSURANCE COMPANIES UNDER PROTEST.

Suits Commenced February, 1912.

Plaintiff	Case No.	Amount of demand	Status of action
Northwestern Mutual*	40655	$10,294 32	Judgment for defendant. On appeal in Supreme Court. No. 7585.

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Suits Commenced February, 1913.

Plaintiff	Case No.	Amount of demand	Status of action
Northwestern Mutual*	47290	$14,316 60	Same as above.
Massachusetts Mutual*	47291	2,273 74	Same as above.
Robert L. Cox, assignee of Germania, National, Equitable, Fidelity Mutual, New England Mutual, The Ætna, Manhattan, Prudential, Travelers, Home, Metropolitan, Mutual Life, Union Central, Pacific Mutual.	47315	37,367 81	Answer filed.

Suits Commenced February, 1914.

Northwestern Mutual	54757	$18,218 02	Not at issue.
Massachusetts Mutual	54758	3,089 80	Not at issue.
New York Life	54663	14,811 18	Answer filed.
Robert L. Cox, assignee of Germania, National, Equitable, Fidelity Mutual, New England Mutual, The Ætna, Manhattan, Prudential, Travelers, Home, Metropolitan, Mutual Life, Union Central, Pacific Mutual, Columbian National.	54740	53,455 47	Answer filed.

Suits Commenced February, 1915.

Northwestern Mutual	62301	$20,223 76	Not at issue.
Massachusetts Mutual	62340	3,448 82	Not at issue.
New York Life	62366	16,860 32	Answer filed.
Robert L. Cox, assignee of Germania, National, Equitable, Fidelity Mutual, New England Mutual, The Ætna, Manhattan, Prudential, Travelers, Home, Metropolitan, Mutual Life, Union Central, Pacific Mutual, Columbian National.	62368	56,036 10	Answer filed.

Suits Commenced February, 1916.

Northwestern Mutual	71782	$24,069 24	Not at issue.
Massachusetts Mutual	71780	4,421 08	Not at issue.
Phœnix Mutual Life	71779	1,285 48	Not at issue.
New York Life	71812	23,892 96	Answer filed.
Robert L. Cox, assignee of Germania, National, Equitable, Fidelity Mutual, New England Mutual, The Ætna, Manhattan, Prudential, Travelers, Home, Metropolitan, Mutual Life, Union Central, Pacific Mutual, Columbian National.	71843	70,957 31	Answer filed.

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*Page 22.

Suit Commenced August, 1916.

Plaintiff	Case No.	Amount of demand	Status of action
Northwestern Mutual		$13,189 27	Demurrer filed.

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*The first three cases shown in the table were tried before Hon. James M. Seawell, Judge of the Superior Court, San Francisco, in August, 1914. These cases were decided in favor of the defendant, the state; the companies thereafter appealed to the Supreme Court, and such appeals are now pending. These cases will be called on the January calendar of the Supreme Court in 1918, unless advanced by order of the court. A petition requesting their advancement, upon a showing of the importance of an early decision, has been prepared and will be presented to the court, with the expectation that favorable action may secure a hearing as early as the January calendar in 1917. A decision may be reasonably expected within three months after such hearing. The remaining actions in which the same companies are plaintiff, and also the action commenced by the New York Life, have not been pressed, pending a decision in the appealed cases, the law of which would be equally applicable to the others and possibly dispense with the necessity of trials. The cases brought in the name of Robert Lynn Cox, as assignee, for the most part of old line or stock companies, involve somewhat different questions of law, and have for one reason or another remained dormant, the plaintiff not having brought them to trial.

Increase of Public Utility Tax Rates.

In the month of December, 1914, the Governor appointed Professor Carl C. Plehn, the then special advisor of this board, and Mr. Clyde L. Seavey, a member of the State Board of Control, to investigate and report upon the question as to whether the public utilities were paying taxes at the same rate as property taxed for local purposes. This board also participated to some extent in such investigation.

The investigation was a proceeding supplementary to, and might be said to have been a continuation of, the investigation made by this board in 1912 and upon which an exhaustive report was made to the legislature in 1913.

Owing to the limit of time which confronted the investigators in 1914 (the legislature meeting in January, 1915), and for other causes explained in the report of the committee, it was found impracticable to go into the matter of appraisement of local property or a revaluation of the property of the public utilities.

The investigators did, however, collect and arrange considerable valuable data on total assessments, taxes, etc., by which satisfactory conclusions could be arrived at as to percentages of taxes paid to actual values by both local property and public utility property.

The committee reported as a finding of fact "that property taxed for local purposes is now bearing a tax equal to 1.2183 per cent of its true value," and further set forth in detail the ratios which should be applied to the public utility corporations to properly adjust the tax burdens, which ratios it seems the legislature finally adopted.

The findings and report of these special investigators are set forth in full in the appendix.

As a result of this investigation, and based directly upon the report of the committee, the legislature on January 28, 1915 (Chapter 2, Laws of 1915), revised the tax rates to be paid by the public utilities as shown in the following table:

	From (1913)	To (1915)
Railroads, including street railways	4.75%	5.25%
Gas and electric companies	4.60%	5.25%
Telegraph and telephone companies	4.20%	4.50%
Express companies	2.00%	1.60%
Car companies	4.00%	3.95%
Insurance companies	1.75%	2.00%
Banks	1.00%	1.20%
General corporate franchises	1.00%	1.20%

As stated above, a revaluation of the public utility properties was out of the question. Hence, in order to determine what the average tax burden was in January, 1915, after the adjustment of ratios, it is necessary to take the valuations, ratios, and other findings as they existed in 1910-1912, and make our computations from that point.

It would therefore appear that, based upon the findings of said committee and the action of the legislature in the adjustment of the corporate tax ratios, the percentage of tax payment to actual values of the public utilities in January, 1915, was as follows:

Tax Burden, Public Utilities, January, 1915.

	Tax rates		Increase+ Decrease−		Ratios of commercial values	
	1910-1912	1915	Absolute	Per cent	1913 rate	1915 rate
Railroads	4.00%	5.25%	+1.25	+31.25	1.1021	1.2353
Gas and electric	4.00%	5.25%	+1.25	+31.25	.8763	1.0177
Telephone and telegraph	3.50%	4.50%	+1.00	+28.5714	1.1245	1.2228
Car companies	3.00%	3.95%	+ .95	+31.6667	1.2587	1.2414
Express companies	2.00%	1.60%	— .40	—20.00	1.5413	1.7677

NOTE.—As determined by this board in the 1912 appraisement and investigation the "net to gross earnings" and the "percentage of tax payment to actual value" of public utilities were as follows:

	Earnings, net to gross	Tax ratios to actual value
Railroads	36.8 %	.9092
Gas and electric	38.23%	.75
Telephone and telegraph	21.10%	.9060
Car companies	14.55%	.8813
Express companies	8.64%	1.5413

Solution:

Railroads	36.8 — 1.25 ÷ 36.8 = .9660	.9092 ÷ .9660 × 1.3125 = 1.2353
Gas and electric	38.23 — 1.25 ÷ 38.23 = .9673	.75 ÷ .9763 × 1.3125 = 1.0177
Telephone and telegraph	21.10 — 1.00 ÷ 21.10 = .9526	.9060 ÷ .9526 × 1.285714 = 1.2228
Car companies	14.55 — .95 ÷ 14.55 = .9347	.8813 ÷ .9347 × 1.316667 = 1.2414
Express companies	8.64 + .40 ÷ 8.64 = 1.0463	1.5413 ÷ 1.0463 × 1.20 = 1.7677

New Investigation of Tax Burden.

The legislature of 1915 authorized the Governor to direct any state officer, or to appoint or authorize the employment of any expert or other assistants to investigate and report to the legislature in January, 1917, among other matters, "the relative burden of taxes borne by general property values and corporation property values taxed directly by the state under the existing system of taxation."

In pursuance of this law the Governor appointed Messrs. C. L. Seavey, E. A. Dickson and Lee C. Gates to make such investigation and report.

The committee appointed by the Governor will render a separate report to the legislature of its findings. However, as to the relative burden of tax ratios paid by the public utilities the preliminary findings of the committee have been made and printed in advance of other matters under investigation, and in this report the committee finds that the public utilities at this date are paying the following percentages of actual property valuations:

Companies	Value	Taxes	Ratio, per cent
Railroad companies	$519,620,000 00	$6,789,063 34	1.3065
Gas and electric companies	224,902,300 00	2,438,576 64	1.0838
Telephone and telegraph companies	60,714,250 00	848,790 92	1.3983
Express companies	4,272,000 00	83,954 28	1.9652
Car companies	11,665,000 00	151,295 02	1.2970
All classes	$821,173,550 00	$10,311,680 20	1.2556

Speaking of the foregoing ratios, the committee says in its report:

> "It was the intent of the legislature in 1915, when it last readjusted the rates of the gross receipts taxes, to impose on all classes of companies a tax that should be, as nearly as possible, equal to 1.25 per cent of the value of the property used. In so far as the stock and bond value is at all an indication of the values of the properties used, it would appear from the table at the beginning that this intent was realized on the average for all companies, but that in no one class was it exactly reached. By that standard the railroads are five one-hundredths of one per cent too high, the gas and electric companies are low, but that may be attributed to the special factors discussed above. The rates on the telephone and telegraph companies are higher than it was intended to make them by nearly fifteen one-hundredths of one per cent, those on the express companies very much higher still, namely, too high by nearly three-fourths of one per cent, and those on the car companies are the nearest to the intended tax."

It is evident that the committee has fallen into a slight error in the above findings. The committee of investigation of 1914, as a matter of fact, found that local property was bearing a tax ratio of 1.2183 per cent of actual value, and it was upon this basis said committee recommended the several increases and decreases in public utility tax ratios to adjust such ratios to that borne by local property. Moreover, as corroboratory, the ratios levied against banks and general corporate franchises by the legislature was 1.2 per cent.

Based upon the assessed value of local property as assessed for the year 1915, and total taxes levied thereon, the committee finds that local property was assessed at approximately 41.929 per cent of the actual value, and that such local property was, in 1915, taxed at 1.2192 per cent of actual value.

The findings of the committee in the matter of the assessed to actual value and tax burden based upon the 1916 assessment was not complete at the time this report went to press.

No Investigation of Tax Burden by State Board of Equalization.

By reason of the passage of the act approved May 10, 1915, "An act authorizing and providing for an investigation and report upon the matter of revenue and taxation, and making an appropriation therefor," and the appointment by the Governor of a committee to carry out the intentions of the act, as set forth above, the State Board of Equalization was of the belief that a separate and independent investigation by this board was unnecessary, and would be a waste of funds. No investigation was therefore undertaken. Moreover, the funds at the command of this board which might be available for such purpose were very limited, while the act authorizing the investigation carried an appropriation of $75,000.

Query as to Necessity for Ascertaining Average Tax Burdens.

Since the adoption of the present state tax system the state has made two rather expensive appraisements of local property and public utility property in an effort to ascertain, as near as may be, the percentage of tax to actual value which each is paying, with the view to an adjustment of the rates if disparity exists. One very full appraisement was made in 1912 and another is now in progress, to be reported to the incoming 1917 legislature. Another "estimate" on a percentage basis was made in 1914.

Our constitution provides that "all property in the state *except as otherwise in this constitution provided,* * * * shall be taxed in proportion to its value, to be ascertained as provided by law, *or as hereinafter provided.*" The italicized words came into the constitution along with the new tax system.

It has generally been considered that under the uniformity clause of the constitution it was necessary to keep as nearly on a level plane the tax which each class of property was compelled to bear. In other words, it was seemingly conceded that it would be unlawful to fix tax ratios against the property of the public utility which would cause that class of property to bear a higher burden than the common forms of property constituting a separate and distinct class.

That this was the legislative view is borne out by the fact that at each adjustment of tax ratios on corporate properties a section was adopted, the last of which read as follows:

> "In so far as the rates of taxation upon the property and franchises described and enumerated in section fourteen of article thirteen of the constitution of the state of California and in section one of said act approved April 1, 1911, as amended February 3, 1913, differ from the rates of taxation upon such property and franchises as fixed and defined by this act, it is hereby declared to be the intent and purpose of the legislature, two-thirds of all the members elected to each of the two houses voting in favor thereof, by virtue of the authority conferred upon the legislature by subdivision *f* of section fourteen of article thirteen of the constitution to change the rates of taxation heretofore fixed and imposed by said section of the constitution and enumerated and specified in said act approved April 1, 1911, as amended February 3, 1913, to the rates fixed, determined, established and set forth by and in this act.
>
> This tax levy, and each and every of the percentages or rates of taxation herein and hereby determined, made, fixed and established to be paid by the persons, firms, companies and corporations specified, described or included in section fourteen of article thirteen of the constitution, are and have been determined, made, fixed and established after a full, complete, open and public investigation and hearing by and before this legislature upon and respecting the value of each and all of the properties and franchises included within or enumerated in section fourteen of article thirteen of the constitution, and of all other and different property subject to taxation of any kind within the state of California, of which investigation and hearing every and all persons, firms, companies and corporations concerned therein or affected thereby had due notice; and at which investigation and hearing the legislature took oral and written evidence and at which hearing every and all persons, firms, companies and corporations concerned therein or affected thereby and who desired so to do, were given an opportunity to and did appear and were heard and introduced evidence before this legislature respecting and showing the value of said properties and franchises included within or enumerated in said section fourteen of article thirteen of the constiution and also respecting and showing the value of all other and different property subject to taxation of any kind within the state of California, and after the due consideration of all of said evidence by this legislature and its ascertainment and determination therefrom and thereon of the value of said and all of said hereinbefore mentioned properties and franchises; and the percentages or rates of taxation

> herein and hereby determined, fixed and established have been and are determined, fixed and established, and have been and are based, upon the value of each, all and every of the properties and franchises included within or enumerated in said section fourteen of article thirteen of the constitution as ascertained and determined as aforesaid by this legislature and constitute and are the percentages or rates of taxation ascertained and determined by this legislature which when applied in the manner provided and required by law, do and will levy a tax upon said properties and franchises included within or enumerated in said section fourteen of article thirteen of the constitution in proportion to the value of the same and in proportion to the value of every and all other and different property subject to taxation of any kind within the state of California as ascertained and determined as aforesaid by this legislature."

In the very recent case of Bank of California National Association against Roberts, as State Treasurer (Supreme Court, September 21, 1916), the question in a manner is touched upon, although the direct question was not before the court in this case. We give herewith, without further comment, an excerpt from the case:

> "Does the constitution of California prohibit such double taxation as may be involved in the assessment here complained of? No doubt our constitution, as it stood prior to the amendments of 1910, did contain such prohibition. Section 1 of article XIII, as it originally read, provided that "All property in the state, not exempt under the laws of the United States, shall be taxed in proportion to its value, to be ascertained as provided by law." This is the language which was held, in the cases above cited, to forbid double taxation. "All property" is not taxed in proportion to its value if some of it is taxed once and some of it more than once upon the ascertained value. (*Burke* vs. *Badlam, supra.*) But when the new system of taxing certain corporations for state purposes was embodied in the constitution, section 1 was also amended. That section was made to read as follows:
>
> "All property in the state *except as otherwise in this constitution provided,* not exempt under the laws of the United States, shall be taxed in proportion to its value, to be ascertained as provided by law, or as hereinafter provided." The change consisted in the addition of the italicized words. Here is an express declaration that the general rule requiring property to be taxed in proportion to its value shall be subject to the qualification that such proportionate method of taxation shall not apply where the constitution makes other provision. It has, as we have seen, made other provision for the assessment of bank property. The respondent claims that the words "except as otherwise in this constitution provided" qualify merely the subject of the sentence, to wit: "all property in the state." In other words, the contention is that this qualifying clause was meant to cover only the exemptions specifically provided for in section 1 and subsequent sections of article XIII. This is a strained interpretation of the language. The amendments to section 1 and to section 14 were proposed and adopted at the same time, and there can be no doubt that the changes formed

> parts of a single comprehensive scheme. The plan of section 14 is in various respects inconsistent with the idea that the property therein described shall be assessed in proportion to its value. The taxes levied, while described as taxes upon the property of corporations, are not based upon any mode of ascertaining either the proportionate or the absolute value of such property. Thus, in subdivision *a*, railroad, telegraph, telephone, gas or electric and certain other companies are subjected to a tax of a certain percentage of their gross receipts from operations within this state. Subdivision *b* imposes upon insurance companies a tax of one and one-half per cent upon the amount of the gross premiums received. Such taxes can not upon any fair construction be said to comply with a requirement that all property shall be taxed in proportion to its value. Surely it was not believed, when section 14 was adopted, that the method of taxation therein provided for should be limited or controlled by any general provision such as that theretofore contained in section 1. The amendment of section 1 was designed to avoid any possible conflict with section 14. Even if, however, there should be any opposition between the general terms of section 1 and the provisions of section 14, the latter, as the more specific and particular enactment, would prevail.''

Conventions of County Officials.

The several county officers of this state have perfected organizations and now hold annual conventions, meeting at different county seats. This board, or some of its members, usually attends the conventions of the assessors, auditors, tax collectors and supervisors.

These annual get-together sessions have accomplished splendid results in the interest of the counties. They act as a clearing house for the mutual exchange of ideas. Valuable and instructive papers are read and discussed. New methods of assessment and of valuing property are constantly coming to the front. Improved methods of writing the rolls and of making up the tax receipts are being evolved, all working to the end of economy and conservation of time. New and improved methods of county and city accounting, in which not alone the state and its subdivisions are interested but the federal government as well—these and many other questions are taken up, debated and solved.

The people of this state must understand that these conventions are undertaken, not in the interest of the individual officer, but solely in the interest of the county which the officer represents.

Under the salaries paid the county officials in a great many of the counties, the expense of attending these conventions works a great hardship on the officials, ofttimes precluding their attendance. Knowing the many advantages which accrue to the counties from these meetings, this board respectfully urges upon the legislature an amendment to the county government act whereby the actual expenses of the officers will be borne from the county funds.

Constitutional Amendments Affecting Taxation.

CHURCHES.

On November 6, 1900, section 1½ was added to Article XIII of the constitution by which church buildings and grounds covered thereby were exempted from all taxation, provided such property was used *exclusively* for religious purposes.

At the special election held on October 26, 1916, a proposition was submitted to the people to broaden the exemption by allowing such church property to be used "for social purposes for the benefit of the organized religious body." The proposition was defeated by the following vote: yes, 94,460; no, 168,171.

TAXATION.

On October 26, 1916, a constitutional amendment was submitted whereby was proposed a repeal of the entire system of taxation for state purposes, known as the "separation system"; the abolishment of the present elective state board of equalization and the creation of an appointive state tax commission in lieu of the board; and generally taking from the constitution the restriction features regarding taxation and making the entire tax scheme for state, county and local purposes, a legislative function free and untrammeled. The proposition was defeated: yes, 42,158; no, 205,597.

SINGLE TAX AND HOME RULE.

The single taxers on November 7, 1916, by an initiative measure, proposed a complete repeal of Article XIII of the constitution, being the fundamental law for all taxation in the state, and submitted in lieu thereof the following:

> "Public revenues, state, county, municipal and district, shall be raised by taxation of land values exclusive of improvements, and no tax or charge for revenue shall be imposed on any labor product, occupation, business or person; but this shall not prevent the assessment of incomes and inheritances to provide funds for old age pensions, mothers' endowments, and workingmen's disemployment and disability insurance.
>
> "Land holdings shall be equally assessed, according to their value for use or occupance, without regard to any work of man thereon; this value shall be determined in municipalities, and wherever else practicable, by the 'Somers system,' or other means of exact computation from central locations.
>
> "The intent of this provision is to take for public use the rental and site values of land, and to reduce land holding to those only who live on or make productive use of it.
>
> "Conflicting provisions are hereby repealed."

This was a most drastic and revolutionary measure which had for its object the placing of California entirely under the single tax propaganda. The voters, however, early awoke to the baneful effect the adoption of such a measure would have and the proposition was defeated by a vote of 260,332 for, and 576,533 against.

This is the third attempt of the single taxers to insidiously overthrow our tax system and inject their noxious creed. In the past few years they have operated under the guise of "home rule in taxation," submitting two constitutional amendments along this line, each of which met with merited defeat.

We feel that no tax law should be submitted to the people except it have the careful scrutiny and consideration of the legislative branch of the state, and particularly do we feel that any measure looking to single tax should come from the proper source, the legislature. In other words, we believe that the initiative feature of our constitution should not be permitted to invoke single tax, or any other tax method for that matter.

We therefore earnestly recommend the submission by the legislature of a constitutional amendment forbidding the practice. In the Ohio constitution (adopted September 3, 1912) we find the following limitation, and we recommend the insertion in our constitution of some provision along the same line:

> "The powers defined herein as the 'initiative' and 'referendum' shall not be used to pass a law authorizing any classification of property for the purpose of levying different rates of taxation thereon or of authorizing the levy of any single tax on land or land values or land sites at a higher rate or by a different rule than is or may be applied to improvements thereon or to personal property."

Respectfully submitted.

R. E. COLLINS, *Chairman.*
JOHN C. CORBETT.
JOHN MITCHELL.
JEFF McELVAINE.
JOHN S. CHAMBERS, *Controller.*

T. M. EBY, *Secretary.*

DETAILED STATEMENT OF EXPENDITURES.

Manner in which the appropriation for postage, expressage, telegraphing and contingent expenses of the State Board of Equalization was expended for the sixty-sixth fiscal year, ending June 30, 1915:

1914.		
July:		
Post office rent	$3 00	
Expressage	44	
Telegraphing	1 10	
Telephone	22 35	
Postage stamps	20 00	
Postage deposit	5 00	
		$51 89
August:		
Expressage	1 54	
Telegraphing	1 35	
Telephone	17 25	
Extra janitor	21 35	
Miscellaneous	1 50	
		42 99
September:		
Post office rent	3 00	
Telegraphing	40	
Telephone	24 80	
Postage stamps	20 00	
Whiskey Hill water	4 50	
		52 70
October:		
Telephone	10 75	
Miscellaneous	1 00	
		11 75
November:		
Telegraphing	40	
Telephone	14 85	
Postage stamps	20 00	
Miscellaneous	1 20	
		36 45
December:		
Post office rent	3 00	
Telegraphing	15 69	
Telephone	16 47	
Whiskey Hill water	4 50	
Law journals	11 00	
Miscellaneous	3 50	
		54 16
1915.		
January:		
Expressage	2 50	
Telegraphing	28 42	
Telephone	36 92	
Postage	12 36	
Rubber stamps	1 00	
Miscellaneous	2 12	
		83 32

February:		
Expressage	27	
Telephone	11 15	
Stamp deposit	5 00	
Miscellaneous	50	
		16 92
March:		
Post office rent	3 00	
Expressage	21	
Telegraphing	64	
Telephone	6 65	
Whiskey Hill water	4 50	
Miscellaneous	75	
		15 75
April:		
Telegraphing	2 36	
Telephone	13 40	
Postal cards	1 00	
Electric fixture	4 75	
Miscellaneous	50	
		22 01
May:		
Telegraphing	2 42	
Telephone	12 05	
Stamp deposit	2 50	
Miscellaneous	50	
		17 47
June:		
Oakland directory		7 08
Total		$412 49

The following claims accrued in the sixty-sixth fiscal year, but were paid in the sixty-seventh fiscal year:

July:		
Expressage	$ 21	
Telegraphing	2 58	
Telephone	19 05	
Whiskey Hill water	4 50	
Law journals	9 08	
Los Angeles directory	8 58	
Miscellaneous	1 50	
		$45 50

I, T. M. Eby, Secretary of the State Board of Equalization, do hereby certify that the foregoing is a true and correct statement, in detail, of the manner in which the appropriation for postage, expressage, telegraphing and contingent expenses was expended, vouchers for all of which are on file with the State Controller.

T. M. EBY.

Subscribed and sworn to before me this 28th day of July, 1916.

JOHN S. CHAMBERS, Controller.

DETAILED STATEMENT OF EXPENDITURES.

Manner in which the appropriation for postage, expressage, telegraphing and contingent expenses of the State Board of Equalization was expended for the sixty-seventh fiscal year, ending June 30, 1916:

1915.		
July:		
Post office rent	$3 00	
Expressage	56	
Telegraphing	40	
Telephone	8 55	
Supplies, Superintendent Capitol	1 84	
Miscellaneous	50	
San Francisco directory	7 50	
		$22 35
August:		
Expressage	2 86	
Telegraphing	2 62	
Telephone	11 75	
Extra porter	9 03	
Miscellaneous	50	
		26 76
September:		
Post office rent	3 00	
Telephone	11 20	
Whiskey Hill water	4 50	
Supplies, Superintendent Capitol	1 47	
Miscellaneous	70	
		20 87
October:		
Telegraphing	2 36	
Telephone	8 70	
California codes	10 00	
Whiskey Hill water	75	
Perfection cooler	10 00	
Law bookcase	21 00	
Miscellaneous	35	
		53 16
November:		
Expressage	21	
Telephone	24 05	
U. S. Supreme Court Reporter	2 00	
Supplies, Superintendent Capitol	3 87	
		30 13
December:		
Post office rent	3 00	
Expressage	21	
Telegraphing	40	
Telephone	10 15	
Law journals	9 00	
Extra porter	7 74	
Rubber stamps	3 45	
Supplies, Superintendent Capitol	1 50	
Miscellaneous	1 50	
		36 95

1916.		
January:		
Expressage	71	
Telegraphing	58	
Telephone	9 60	
Rubber stamps	2 25	
Supplies, Superintendent Capitol	3 26	
Miscellaneous	60	
		17 00
February:		
Expressage	7 05	
Telegraphing	74	
Telephone	7 35	
Supplies, Superintendent Capitol	1 72	
Miscellaneous	50	
		17 36
March:		
Post office rent	3 00	
Expressage	45	
Telegraphing	1 36	
Telephone	9 75	
Supplies, Superintendent Capitol	2 45	
Miscellaneous	3 15	
		20 16
April:		
Expressage	2 72	
Telegraphing	50	
Telephone	7 20	
Supplies, Superintendent Capitol	4 60	
		15 02
May:		
Expressage	2 16	
Telegraphing	4 28	
Telephone	9 35	
Supplies, Superintendent Capitol	43	
		16 22
Total		$275 98

The following claims accrued in the sixty-seventh fiscal year, but were paid in the sixty-eighth fiscal year:

July:		
Expressage	$ 73	
Telegraphing	96	
Telephone	15 90	
Six dozen towels	15 84	
Law journals	9 08	
San Francisco directory	7 50	
Los Angeles directory	8 58	
State Purchasing Department	2 85	
Miscellaneous	3 98	
		$65 42

I, T. M. Eby, Secretary of the State Board of Equalization, do hereby certify that the foregoing is a true and correct statement, in detail, of the manner in which the appropriation for postage, expressage, telegraphing and contingent expenses was expended, vouchers for all of which are on file with the State Controller.

T. M. EBY.

Subscribed and sworn to before me this 28th day of July, 1916.

JOHN S. CHAMBERS, Controller.

APPENDIX.

SCHEDULE A.

Veterans' Exemption.

County	1915		1916	
	Number of claimants	Value of exemptions	Number of claimants	Value of exemptions
Alameda	1,603	$942,725	1,362	$1,011,825
Alpine	1	1,000	1	1,000
Amador	25	19,310	24	19,730
Butte	185	127,230	196	136,230
Calaveras	39	28,345	40	26,710
Colusa	31	21,295	31	21,470
Contra Costa	177	108,240	205	113,825
Del Norte	14	8,750	14	9,200
El Dorado	48	29,145	49	32,040
Fresno	427	338,270	417	257,633
Glenn	29	20,888	39	26,685
Humboldt	142	72,775	131	64,360
Imperial	88	85,000	87	54,203
Inyo	28	24,160	28	24,000
Kern	172	100,225	147	93,430
Kings	89	60,090	89	57,105
Lake	49	31,240	47	8,540
Lassen	15	9,575	18	11,238
Los Angeles	4,535	3,618,175	5,335	2,097,950
Madera	44	29,120	48	29,860
Marin	126	80,280	121	76,325
Mariposa	12	7,000	14	8,400
Mendocino	73	43,525	99	63,260
Merced	63	34,365	74	39,775
Modoc	29	20,980	31	20,960
Mono	4	1,625	3	1,125
Monterey	201	149,415	212	170,860
Napa	150	122,525	142	117,650
Nevada	27	22,150	25	21,450
Orange	385	258,910	386	265,540
Placer	85	55,250	72	57,600
Plumas	6	2,995	8	6,125
Riverside	460	268,900	422	288,495
Sacramento	259	169,750	283	185,580
San Benito	24	16,830	19	16,155
San Bernardino	495	324,860	418	255,970
San Diego	1,476	748,185	1,487	749,570
San Joaquin	240	177,558	241	175,790
San Francisco	847	690,872	1,179	826,671
San Luis Obispo	129	77,812	132	80,489
San Mateo	203	75,675	250	82,255
Santa Barbara	148	103,920	149	104,290
Santa Clara	545	525,210	514	430,730
Santa Cruz	254	156,735	248	164,000
Shasta	102	54,880	106	64,000
Sierra	9	4,650	10	5,650
Siskiyou	52	30,170	51	34,310
Solano	350	266,010	366	281,745
Sonoma	381	284,115	354	272,450
Stanislaus	137	93,990	137	96,115
Sutter	34	24,705	45	30,920
Tehama	110	74,400	106	69,760
Trinity	17	8,135	14	9,410
Tulare	299	171,875	264	168,300
Tuolumne	20	11,640	14	7,950
Ventura	83	58,200	78	56,400
Yolo	49	34,570	53	35,295
Yuba	22	13,650	24	13,170
Totals	15,647	$10,942,175	16,459	$9,451,574

SCHEDULE B.

Showing Number of Acres Assessed, as per Auditor's Statements, and Value of All Real Estate and Improvements, for 1915.

Counties	Acres assessed	Value of real estate other than city and town lots	Value of city and town lots	Value of all real estate (nonoperative)	Value of improvements on real estate other than city and town lots	Value of improvements on city and town lots	Value of all improvements (nonoperative)
Alameda	427,559	$18,967,511	$129,081,725	$148,049,236	$3,672,000	*$60,468,575	$64,140,575
Alpine	42,363	469,159	----------------	469,159	108,190	----------------	108,190
Amador	296,777	3,266,073	313,770	3,579,843	809,595	*846,372	1,655,967
Butte	908,906	9,751,275	2,010,255	11,761,530	1,721,040	3,193,850	4,914,890
Calaveras	503,393	4,201,660	213,265	4,414,925	991,950	651,785	1,643,735
Colusa	614,463	10,908,100	494,180	11,402,280	682,225	832,580	1,514,805
Contra Costa	465,014	15,864,365	11,186,600	27,050,965	6,712,180	6,149,820	12,862,000
Del Norte	220,467	4,411,107	112,230	4,523,337	108,730	135,535	244,265
El Dorado	672,931	3,702,665	231,225	3,933,890	659,255	510,185	1,169,440
Fresno	2,241,168	37,556,210	14,672,960	52,229,170	9,008,590	*10,184,840	19,193,430
Glenn	628,783	11,504,592	902,087	12,406,679	676,494	683,070	1,359,564
Humboldt	1,636,259	20,029,220	4,553,035	24,582,255	1,399,520	2,839,385	4,238,905
Imperial	952,845	14,685,994	3,329,984	18,015,978	895,859	1,886,885	2,782,744
Inyo	287,500	4,756,470	562,580	5,319,050	702,355	*481,285	1,183,640
Kern	3,178,967	42,306,739	4,106,005	46,412,744	4,503,755	*7,430,691	11,934,446
Kings	823,177	8,918,370	882,965	9,801,335	1,190,425	*1,152,020	2,342,445
Lake	370,166	3,032,310	367,645	3,399,955	590,165	330,510	920,675
Lassen	803,630	4,854,379	147,601	5,001,980	495,378	339,310	834,688
Los Angeles	1,123,692	105,338,780	335,051,775	440,390,555	13,074,680	162,385,310	175,459,990
Madera	761,884	10,360,245	582,235	10,942,480	702,395	473,140	1,175,535
Marin	320,700	7,217,640	6,447,380	13,665,020	1,301,330	4,876,125	6,177,455
Mariposa	329,853	2,136,819	69,075	2,205,894	365,217	*149,250	514,467
Mendocino	1,644,085	10,389,016	992,670	11,381,686	1,039,710	*1,245,865	2,285,575
Merced	1,176,937	15,269,480	984,780	16,254,260	1,635,225	*1,440,555	3,075,780
Modoc	678,955	4,747,708	174,522	4,922,230	600,313	407,450	1,007,763
Mono	156,281	626,090	11,665	637,755	122,685	49,260	171,945
Monterey	1,421,861	17,188,110	3,681,945	20,870,055	2,159,763	2,702,395	4,862,158
Napa	415,045	6,100,000	2,144,005	8,244,005	2,741,105	2,757,475	5,498,580
Nevada	480,590	2,710,430	444,730	3,155,160	1,318,385	1,218,805	2,537,190
Orange	431,625	23,983,365	5,917,310	29,900,675	4,532,830	4,419,970	8,952,800
Placer	625,260	6,358,925	1,056,720	7,415,645	1,260,430	*1,681,620	2,942,050
Plumas	533,095	4,912,618	158,343	5,070,961	348,930	351,680	700,610

Riverside	1,258,596	14,828,730	3,458,300	18,287,030	3,295,095	4,018,935	7,314,030
Sacramento	611,014	19,944,124	35,739,070	55,683,194	2,798,650	17,646,620	20,445,270
San Benito	591,723	4,933,825	543,465	5,477,290	901,200	662,265	1,563,465
San Bernardino	1,371,118	19,358,925	7,029,890	26,388,815	7,380,110	6,076,450	13,456,560
San Diego	1,179,110	9,061,187	43,043,962	52,105,149	1,294,550	*9,819,985	11,114,535
San Francisco	29,760	6,255,020	298,033,131	304,288,151	671,700	171,854,627	172,526,327
San Joaquin	869,951	26,269,748	10,579,819	36,849,567	3,808,845	10,458,482	14,267,327
San Luis Obispo	1,609,516	8,392,806	1,511,052	9,903,858	1,418,740	2,064,046	3,482,786
San Mateo	307,382	14,561,570	7,891,285	22,452,855	5,273,315	*3,730,840	9,004,155
Santa Barbara	1,063,051	12,260,975	4,432,255	16,693,230	2,429,390	5,204,785	7,634,175
Santa Clara	742,225	28,539,575	18,461,325	47,000,900	9,450,000	*13,842,605	23,292,605
Santa Cruz	259,203	5,602,310	5,448,780	11,051,090	2,180,800	3,350,960	5,531,760
Shasta	1,461,472	7,967,225	611,825	8,579,050	1,428,480	1,099,400	2,527,880
Sierra	324,982	1,587,590	53,030	1,640,620	231,365	*228,890	460,255
Siskiyou	1,832,029	11,320,210	483,900	11,804,110	1,186,565	*1,213,390	2,399,955
Solano	515,863	12,440,874	2,227,045	14,667,919	2,414,425	*3,488,905	5,903,330
Sonoma	904,463	16,866,980	4,216,490	21,083,470	5,774,745	*5,104,820	10,879,565
Stanislaus	871,500	16,486,790	2,295,740	18,782,530	2,515,240	*3,438,155	5,953,395
Sutter	374,513	8,695,080	300,460	8,995,540	873,390	360,870	1,234,260
Tehama	1,298,875	8,415,990	674,320	9,090,310	1,165,400	1,273,550	2,438,950
Trinity	578,894	2,439,675	27,680	2,467,355	228,745	79,670	308,415
Tulare	1,421,880	27,243,910	2,941,850	30,185,760	6,009,910	3,172,515	9,182,425
Tuolumne	442,507	5,036,135	451,825	5,487,960	1,200,590	1,006,745	2,207,335
Ventura	564,117	19,533,890	2,363,245	21,897,135	1,676,650	*1,720,230	3,396,880
Yolo	596,220	14,224,950	1,360,825	15,585,775	1,422,950	*1,943,635	3,366,585
Yuba	395,842	3,718,240	861,905	4,580,145	462,235	1,374,395	1,836,630
Totals	46,650,037	$762,511,759	$985,927,741	$1,748,439,500	$133,623,789	$556,511,368	$690,135,157

*Includes value of improvements on land assessed to others than the owners of such land.

SCHEDULE C.

Showing Values of All Property—Nonoperative and Operative—as Returned by Auditors, and After Equalization by the State Board, for 1915.

Counties	Value of real estate and improvements	Personal property other than money and solvent credits	Money and solvent credits	Value of nonoperative property	Value of operative property assessed locally	Total value of property as returned by auditors	Railroad assessments made by the State Board of Equalization (operative property)	Grand total value of all property
Alameda	$212,189,811	$20,659,891	$1,932,200	$234,781,902	$22,500,916	$257,282,818	$5,194,893	$262,477,711
Alpine	577,349	76,214	-------	653,563	127,750	781,313	-------	781,313
Amador	5,235,810	691,693	500	5,928,003	599,313	6,527,316	212,012	6,739,328
Butte	16,676,420	3,255,600	61,920	19,993,940	2,154,980	22,148,920	2,793,071	24,941,991
Calaveras	6,058,660	638,110	13,960	6,710,730	497,605	7,208,335	408,885	7,617,220
Colusa	12,917,085	1,703,186	15,280	14,635,551	395,923	15,031,474	985,429	16,016,903
Contra Costa	39,912,965	7,473,917	633,130	48,020,012	2,163,997	50,184,009	4,118,630	54,302,639
Del Norte	4,767,602	293,000	-------	5,060,602	17,050	5,077,652	-------	5,077,652
El Dorado	5,103,330	866,655	2,175	5,972,160	263,350	6,235,510	796,569	7,032,079
Fresno	71,422,600	12,334,428	326,248	84,083,276	5,525,810	89,609,086	8,194,296	97,803,382
Glenn	13,766,243	1,883,096	6,365	15,655,704	299,592	15,955,296	1,513,655	17,468,951
Humboldt	28,821,160	3,033,273	91,179	31,945,612	1,097,116	33,042,728	1,700,055	34,742,783
Imperial	20,798,722	3,904,637	-------	24,703,359	1,640,568	26,343,927	2,777,594	29,121,521
Inyo	6,502,690	1,138,430	9,352	7,650,472	1,273,555	8,924,027	3,226,926	12,150,953
Kern	58,347,190	15,069,865	6,675	73,423,730	7,040,553	80,464,283	8,384,704	88,848,987
Kings	12,143,780	2,813,445	21,123	14,978,348	497,953	15,476,301	2,205,554	17,681,855
Lake	4,320,630	626,840	29,470	4,976,940	19,595	4,996,535	-------	4,996,535
Lassen	5,836,668	1,738,533	26,003	7,601,204	162,741	7,763,945	2,622,204	10,386,149
Los Angeles	615,850,545	80,349,340	11,623,715	707,823,600	141,556,105	849,379,705	10,848,250	860,227,955
Madera	12,118,015	1,526,225	2,775	13,647,015	571,935	14,218,950	1,804,789	16,023,739
Marin	19,842,475	1,554,575	3,515	21,400,565	825,005	22,225,570	1,220,821	23,446,391
Mariposa	2,720,361	576,461	1,300	3,298,122	22,217	3,320,339	362,950	3,683,289
Mendocino	13,667,261	2,285,853	47,684	16,000,798	738,202	16,739,000	1,577,680	18,316,680
Merced	19,330,040	3,468,805	-------	22,798,845	369,735	23,168,580	3,376,288	26,544,868
Modoc	5,929,993	1,714,205	104,850	7,749,048	85,323	7,834,371	234,119	8,068,490
Mono	809,700	327,980	1,600	1,139,280	81,720	1,221,000	690,797	1,911,797
Monterey	25,732,213	4,440,860	2,430	30,175,503	741,901	30,917,404	3,654,939	34,572,343
Napa	13,742,585	2,612,685	52,775	16,408,045	508,401	16,916,446	1,773,267	18,689,713
Nevada	5,692,350	926,140	14,965	6,633,455	906,910	7,540,365	807,266	8,347,631
Orange	38,853,475	9,323,670	71,550	48,248,695	3,701,660	51,950,355	3,316,273	55,266,628
Placer	10,357,695	619,785	12,050	10,989,530	1,248,290	12,237,820	2,517,191	14,755,011

Plumas	5,771,571	1,031,929	23,212	6,826,712	1,491,813	8,318,525	2,054,385	10,372,910
Riverside	25,601,060	2,428,735		28,029,795	1,583,225	29,613,020	5,576,127	35,189,147
Sacramento	76,128,464	8,466,890	483,130	85,078,484	7,487,300	92,565,784	3,841,161	96,406,885
San Benito	7,040,755	1,350,270		8,391,025	379,840	8,770,865	499,961	9,270,826
San Bernardino	39,845,375	2,816,423	18,665	42,680,463	6,092,440	48,772,903	17,495,327	66,268,230
San Diego	63,219,684	6,443,948	221,075	69,884,707	4,320,111	74,204,818	2,484,319	76,689,137
San Francisco	476,814,478	45,942,943	15,935,329	538,692,750	117,746,384	656,439,134	344,103	656,783,237
San Joaquin	51,116,894	7,383,640	184,724	58,685,258	4,057,604	62,742.862	5,679,085	68,421,947
San Luis Obispo	13,386,644	5,268,193	5,794	18,660,631	758,011	19,418,642	2,089,127	21,507,769
San Mateo	31,457,010	2,032,715	346,250	33.835,975	1,100,000	34,935,975	1,050,994	35,986,969
Santa Barbara	24,327,405	5,434,720	11,100	29,773,225	1,838,140	31,611,365	3,441,553	35,052,918
Santa Clara	70,293,505	6,722,170	689,590	77,705,265	6.302,075	84,007,340	2,516,321	86,523,661
Santa Cruz	16,582,850	1,972,765	16,955	18,572,570	939,440	19,512,010	1,290.033	20,802,043
Shasta	11,106,930	1,304,850		12,411,780	1,132,825	13.514,605	1.707,466	15,252,071
Sierra	2,100,875	227,620	1,510	2,330,005	67,705	2,397,710	118.761	2,516.471
Siskiyou	14,204,065	2,965,580	117,505	17,287,150	844,725	18,131,875	3,208,788	21,340,663
Solano	20,571,249	2,693,687	20,715	23,285,651	1.248,915	24,534,566	2,228,700	26,763,266
Sonoma	31,963,035	5,175,885	120,715	37,259,635	1,611,835	38,871,470	2,795,038	41,666,508
Stanislaus	24,735,925	4,297,775	121,900	29,155,600	1,176,925	30,332,525	2,861,455	33,193,980
Sutter	10,229,800	1,180,685	51,810	11,462,295	308,853	11,771,148	1,587,637	13,358.785
Tehama	11,529,260	2,396,345	110,165	14,035,770	672,565	14,708,335	1,331,388	16,039,723
Trinity	2,775,770	397,875	6,900	3,180,545	52,430	3,232,975	168,004	3,400,979
Tulare	39,368,185	5,190,455	46,540	44,605,180	2,151,000	46,756,180	5,925,092	52,681,272
Tuolumne	7,695,295	878,530	3,901	8,577,726	1,088,424	9,666,150	460,458	10.126,608
Ventura	25,294,015	3,108,699	10,687	28,413,401	853,258	29,266,659	2,893,158	32,159,817
Yolo	18,952,360	2,610,030	33,400	21,595,790	717,040	22,312,830	2,641,176	24,954,006
Yuba	6.416,775	1,964,175	7.830	8,388,780	825,115	9,213,895	1,296,992	10,510,887
Totals	$2,438,574,657	$319,614,929	$33,704,191	$2,791,893,777	$364,483,769	$3,156,377,546	$154,935,636	$3,311,313,182

NOTE.—No ad valorem tax for state purposes collected on these assessments.

SCHEDULE D.

Number of Acres Assessed, as per Auditor's Statements, and Value of Real Estate and Improvements, for 1916.

Counties	Acres assessed	Value of real estate other than city and town lots	Value of city and town lots	Value of all real estate (nonoperative)	Value of improvements on real estate other than city and town lots	Value of improvements on city and town lots	Value of all improvements (nonoperative)
Alameda	458,370	$19,085,466	$128,332,650	$147,418,116	$3,916,275	*$61,756,275	$65,672,550
Alpine	42,947	467,373	----------------	467,373	108,555	----------------	108,555
Amador	297,858	3,347,993	395,215	3,743,208	796,030	*878,890	1,674,920
Butte	900,618	10,123,560	1,996,195	12,119,755	1,668,550	3,229,780	4,898,330
Calaveras	501,317	4,394,140	207,805	4,601,945	1,076,950	627,075	1,704,025
Colusa	612,467	10,892,765	527,460	11,420,225	761,605	845,260	1,606,865
Contra Costa	459,505	15,239,995	11,244,140	26,484,135	7,859,215	6,805,080	14,664,295
Del Norte	220,958	4,348,645	120,605	4,469,250	115,445	151,410	266,855
El Dorado	671,741	4,719,955	284,730	5,004,685	665,970	520,435	1,186,405
Fresno	2,251,340	38,237,455	15,003,975	53,241,430	8,515,668	*10,670,705	19,186,373
Glenn	622,414	12,300,461	822,094	13,122,555	822,735	698,556	1,521,291
Humboldt	1,650,336	19,853,175	4,546,575	24,399,750	1,268,750	2,991,720	4,260,470
Imperial	992,686	15,944,748	3,223,585	19,168,333	972,656	2,011,990	2,984,646
Inyo	275,436	4,857,716	560,845	5,418,561	722,040	*478,100	1,200,140
Kern	3,225,581	42,470,033	4,121,170	46,591,203	5,288,725	*7,031,989	12,320,714
Kings	823,434	9,483,425	961,910	10,445,335	1,158,135	*1,180,785	2,338,920
Lake	373,047	3,033,965	370,400	3,404,365	594,475	331,215	925,690
Lassen	820,981	4,861,314	159,217	5,020,531	508,273	333,080	841,353
Los Angeles	1,208,856	119,188,290	414,429,385	533,617,675	14,334,460	155,549,365	169,883,825
Madera	765,669	10,742,995	652,375	11,395,370	625,515	480,885	1,106,400
Marin	321,871	6,969,215	6,912,155	13,881,370	1,140,025	5,085,285	6,225,310
Mariposa	334,510	2,200,008	61,105	2,261,113	351,986	*149,780	501,766
Mendocino	1,649,047	10,590,560	988,120	11,578,680	1,046,805	1,286,520	2,333,325
Merced	1,179,401	15,266,825	1,069,000	16,335,825	1,619,790	*1,571,710	3,191,500
Modoc	687,736	4,743,785	181,365	4,925,150	584,880	440,685	1,025,565
Mono	174,957	1,356,010	11,450	1,367,460	206,380	49,485	255,865
Monterey	1,457,998	17,907,509	3,708,022	21,615,531	2,249,425	2,778,065	5,027,490
Napa	410,310	6,799,130	2,327,040	9,126,170	2,763,475	2,834,875	5,598,350
Nevada	480,764	2,844,080	453,345	3,297,425	1,307,445	1,217,050	2,524,495
Orange	446,012	23,787,070	6,467,380	30,254,450	4,948,140	4,617,950	9,566,090
Placer	632,270	5,346,250	893,210	6,239,460	1,297,830	1,454,375	2,752,205
Plumas	529,305	5,179,856	188,540	5,368,396	392,550	354,025	746,575

Riverside	1,789,975	15,028,723	3,587,600	18,616,323	3,698,590	4,239,890	7,938,480
Sacramento	600,146	20,761,996	35,110,780	55,872,776	2,950,190	16,883,080	19,833,270
San Benito	592,658	5,421,505	598,580	6,020,085	926,275	664,895	1,591,170
San Bernardino	1,379,864	19,693,645	7,021,315	26,714,960	8,012,620	5,693,535	13,706,155
San Diego	1,179,782	9,783,798	43,591,619	53,375,417	1,453,630	*10,051,400	11,505,030
San Francisco	29,760	5,977,950	296,597,539	302,575,489	577,600	174,810,005	175,387,605
San Joaquin	870,916	26,579,987	10,760,339	37,340,326	4,255,407	10,827,725	15,083,132
San Luis Obispo	1,626,445	8,659,820	1,247,561	9,907,381	1,543,264	2,133,537	3,676,801
San Mateo	307,332	14,567,765	7,539,620	22,107,385	5,399,715	*4,281,040	9,680,755
Santa Barbara	1,042,107	12,965,925	4,470,505	17,436,430	2,501,165	5,470,745	7,971,910
Santa Clara	743,822	28,637,210	18,550,670	47,187,880	9,413,970	*14,294,920	23,708,890
Santa Cruz	259,290	5,648,135	5,214,505	10,862,640	2,250,940	3,231,310	5,482,250
Shasta	1,483,086	9,451,330	695,215	10,146,545	1,464,440	1,075,765	2,540,205
Sierra	325,431	1,601,040	51,060	1,652,100	226,395	*213,320	439,715
Siskiyou	1,870,241	11,392,480	496,580	11,889,060	1,158,215	1,117,875	2,276,090
Solano	515,215	12,521,130	2,255,145	14,776,275	2,466,750	*3,589,555	6,056,305
Sonoma	914,985	16,863,245	4,199,375	21,062,620	5,718,600	*5,148,735	10,867,335
Stanislaus	870,900	16,479,740	2,297,790	18,777,530	2,700,265	*3,620,040	6.320,305
Sutter	374,513	8,677,785	298,655	8,976,440	926,220	366,280	1,292,500
Tehama	1,295,611	8,414,850	678,565	9,093,415	1,098,175	1,299,000	2.397,175
Trinity	582,980	2,463,320	26,685	2,490,005	227,245	80,055	307,300
Tulare	1,412,396	27,105,990	2,913,260	30,019,250	6,438,635	3,186,430	9,625,065
Tuolumne	450,629	4,362,622	441,065	4,803,687	1,129,490	972,250	2,101,740
Ventura	563,766	19,535,065	2,426,085	21,961,150	1,777,510	*1,777,970	3,555,480
Yolo	597,763	14,213,930	1,353,365	15,567,295	1,410,755	*2,032,905	3,443,660
Yuba	396,104	3,672,580	850,650	4,523,230	466,960	1,389,700	1,856,660
Totals	47,555,459	$787,065,333	$1,064,495,191	$1,851,560,524	$139,881,779	$556,867,362	$696,749,141

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*Includes value of improvements on lands assessed to others than the owners of such land.

SCHEDULE E.

Showing Values of All Property—Nonoperative and Operative—as Returned by County Auditors, and After Equalization by the State Board, for 1916.

Counties	Value of real estate and improvements	Personal property other than money and solvent credits	Money and solvent credits	Value of nonoperative property	Value of operative property locally assessed	Total value of property as returned by auditors	Railroad assessments made by the State Board of Equalization (operative property)	Grand total value of all property
Alameda	$213,090,666	$20,633,486	$1,649,180	$235,373,332	$21,682,244	$257,055,576	$5,262,270	$262,317,846
Alpine	575,928	69,344	-----	645,272	119,550	764,822	-----	764,822
Amador	5,418,128	752,693	-----	6,170,821	605,545	6,776,366	212,230	6,988,596
Butte	17,018,085	3,141,690	32,260	20,192,035	2,164,135	22,356,170	3,471,811	25,827,981
Calaveras	6,305,970	986,670	12,420	7,305,060	498,595	7,803,655	408,854	8,212,509
Colusa	13,027,090	1,755,080	34,470	11,816,640	434,407	15,251,047	991,290	16,242,337
Contra Costa	41,148,430	8,628,061	2,089,245	51,865,736	2,227,416	54,093,152	4,162,807	58,255,959
Del Norte	4,736,105	252,305	250	4,988,660	35,050	5,023,710	-----	5,023,710
El Dorado	6,191,090	816,240	600	7,007,930	263,302	7,271,232	797,386	8,068,618
Fresno	72,427,803	12,931,585	290,132	85,649,520	5,742,404	91,391,924	8,208,403	99,600,327
Glenn	14,643,846	1,301,975	14,350	15,960,171	290,937	16,251,108	1,519,306	17,770,414
Humboldt	28,660,220	2,988,492	61,123	31,709,835	1,106,680	32,816,515	1,705,704	34,522,219
Imperial	22,152,979	3,974,228	-----	26,127,207	1,818,202	27,945,409	2,799,256	30,744,665
Inyo	6,618,701	1,227,081	11,788	7,857,570	1,082,244	8,939,814	3,293,453	12,233,267
Kern	58,911,917	16,436,938	4,280	75,353,135	7,268,235	82,621,370	8,460,044	91,081,414
Kings	12,784,255	2,887,290	13,445	15,684,990	567,405	16,252,395	2,188,965	18,441,360
Lake	4,333,055	585,925	15,650	4,934,630	19,820	4,954,450	-----	4,954,450
Lassen	5,861,884	1,816,001	28,127	7,706,012	178,925	7,884,937	2,697,635	10,582,572
Los Angeles	703,501,500	84,805,226	9,581,080	797,887,806	182,242,600	980,130,406	10,977,331	991,107,737
Madera	12,501,770	1,626,659	78	14,128,507	593,430	14,721,937	1,821,157	16,543,094
Marin	20,106,680	1,667,635	147,265	21,921,580	845,650	22,767,230	1,223,859	23,991,089
Mariposa	2,762,879	620,104	1,455	3,384,438	22,547	3,406,985	388,116	3,795,101
Mendocino	13,912,005	2,446,093	70,161	16,428,259	651,879	17,080,138	1,576,029	18,656,167
Merced	19,527,325	3,607,565	-----	23,134,890	370,505	23,505,395	3,415,049	26,920,444
Modoc	5,950,715	1,767,471	128,915	7,847,101	76,248	7,923,349	231,982	8,155,331
Mono	1,623,325	303,100	-----	1,926,425	7,820	1,934,245	702,555	2,636,800
Monterey	26,643,021	4,478,572	500	31,122,093	722,278	31,844,371	3,686,268	35,530,639
Napa	14,724,520	2,648,870	47,055	17,420,445	531,983	17,952,428	1,777,429	19,729,857
Nevada	5,821,920	933,835	22,430	6,778,185	951,975	7,730,160	817,067	8,547,227
Orange	39,820,540	9,704,475	61,775	49,586,790	4,521,555	54,108,345	3,295,245	57,403,590

Placer	8,991,665	651,910	19,650	9,663,225	1,314,415	10,977,640	2,559,005	13,536,645
Plumas	6,114,971	1,077,160	24,571	7,216,702	1,575,766	8,792,468	2,128,302	10,920,770
Riverside	26,554,803	2,569,790		29,124,593	1,853,860	30,978,453	5,588,932	36,567,385
Sacramento	75,706,046	8,658,790	615,560	84,980,396	7,719,400	92,699,796	3,874,070	96,573,866
San Benito	7,611,255	1,515,175		9,126,430	447,100	9,573,530	502,769	10,076,299
San Bernardino	40,421,115	3,226,235	26,015	43,673,365	6,701,830	50,375,195	17,582,934	67,958,129
San Diego	64,880,447	6,511,952	977,381	72,369,783	4,635,570	77,005,353	2,483,344	79,488,697
San Francisco	477,963,094	47,368,558	17,231,204	542,562,856	217,813,082	760,375,938	346,458	760,722,396
San Joaquin	52,423,458	7,743,987	257,141	60,424,586	4,236,439	64,661,025	5,722,422	70,383,447
San Luis Obispo	13,584,182	5,663,994	1,100	19,249,276	756,583	20,005,859	2,104,218	22,110,077
San Mateo	31,788,140	2,068,220	290,950	34,147,310	1,124,535	35,271,845	1,058,910	36,330,755
Santa Barbara	25,408,340	5,798,775	10,200	31,217,315	1,829,340	33,046,655	3,456,420	36,503,075
Santa Clara	70,896,770	6,700,865	671,835	78,269,470	6,441,830	84,711,300	2,539,060	87,250,360
Santa Cruz	16,344,890	1,926,400	7,005	18,278,295	1,100,365	19,378,660	1,290,808	20,669,468
Shasta	12,686,750	1,656,105		14,342,855	1,091,400	15,434,255	1,747,684	17,181,939
Sierra	2,091,815	200,630	1,785	2,294,230	68,260	2,362,490	89,036	2,451,526
Siskiyou	14,165,150	3,068,515	54,345	17,288,010	930,760	18,218,770	3,283,298	21,502,068
Solano	20,832,580	2,888,521	18,592	23,739,693	1,233,477	24,973,170	2,324,926	27,298,096
Sonoma	31,929,955	4,691,845	145,495	36,767,295	1,616,755	38,384,050	2,800,820	41,184,870
Stanislaus	25,097,835	4,423,340	135,920	29,657,095	1,196,265	30,853,360	2,878,523	33,731,883
Sutter	10,268,940	1,289,580	23,850	11,582,370	291,767	11,874,137	1,595,822	13,469,959
Tehama	11,490,590	2,313,140	76,000	13,879,730	662,785	14,542,515	1,354,462	15,896,977
Trinity	2,797,305	403,000	8,115	3,208,420	55,118	3,263,538	168,441	3,431,979
Tulare	39,644,315	5,382,375	39,130	45,065,820	2,142,660	47,208,480	6,112,193	53,320,673
Tuolumne	6,905,427	1,000,803	3,116	7,909,346	1,125,824	9,035,170	458,737	9,493,907
Ventura	25,516,630	3,356,460	10,565	28,883,655	853,258	29,736,913	2,905,084	32,641,997
Yolo	19,010,955	2,462,490	22,300	21,495,745	685,315	22,181,060	2,649,994	24,831,054
Yuba	6,379,890	2,150,955	14,635	8,545,480	853,070	9,398,550	1,308,417	10,706,967
Totals	$2,548,309,665	$332,564,259	$35,004,497	$2,915,878,421	$508,000,395	$3,423,878,816	$157,006,590	$3,580,885,406

NOTE.—No ad valorem tax for state purposes collected on these assessments.

SCHEDULE F.

Valuation of Real and Personal Property and Rate of Taxation (for State Purposes) on Each One Hundred Dollars, from the Organization of the State Government to the Year 1916, Inclusive.

Year	Total assessed value of property in California	Value of personal property, including money	Percentage of personal property	State rate of taxation
1850	$57,670,689	$13,968,797	24.22	.50
1851	49,231,052	20,935,116	42.52	.65
1852	64,579,375	24,213,395	37.49	.65
1853	95,335,646	33,674,000	35.32	.60
1854	111,191,630	39,040,428	35.11	.60
1855	103,887,193	34,858,319	33.56	.60
1856	115,007,440	40,942,699	35.60	.70
1857	126,059,461	59,149,630	46.92	.70
1858	125,955,877	54,185,728	43.01	.60
1859	131,060,279	56,580,344	43.17	.60
1860	148,193,540	68,369,383	46.06	.60
1861	147,811,617	73,350,591	49.62	.60
1862	160,369,071	74,014,666	46.15	.77
1863	174,104,955	80,496,645	46.23	.92
1864	179,164,730	78,117,375	43.60	1.25
1865	183,534,312	79,782,436	43.47	1.15
1866	200,368,825	92,490,635	46.15	1.13
1867	212,205,339	100,105,600	47.17	1.13
1868	237,483,175	105,112,083	44.26	1.00
1869	260,563,879	104,723,592	40.19	.97
1870	277,538,134	108,001,588	38.90	.865
1871	267,868,126	86,074,230	32.13	.865
1872	637,232,823	219,942,323	34.51	.50
1873	528,747,043	118,425,520	22.20	.50
1874	611,495,197	210,779,127	34.46	.649
1875	618,083,315	199,243,292	32.07	.605
1876	595,073,177	140,431,866	23.60	.735
1877	586,953,022	128,780,824	21.77	.63
1878	584,578,036	118,304,451	20.23	.55
1879	549,142,610	112,325,850	20.45	.625
1880	666,399,985	174,514,906	26.18	.64
1881	659,835,762	160,058,309	24.24	.655
1882	608,555,960	134,048,617	22.02	.596
1883	765,729,430	167,338,644	21.85	.497
1884	821,078,767	166,394,997	20.26	.452
1885	859,512,384	172,760,681	20.09	.544
1886	817,445,729	152.889,567	18.70	.53
1887	956,740,805	165,663,387	17.31	.608
1888	1,107,952,700	173,273,458	15.63	.504
1889	1,111,550,979	170,661,836	15.35	.722
1890	1,101,137,290	169,489,475	15.39	.58
1891	1,242,300,434	190,163,597	15.30	.446
1892	1,275.678,822	186,579,990	14.62	.434
1893	1,216,380,398	173,509,311	14.26	.576
1894	1,204,347,291	162,641,812	13.50	.493
1895	1,132,512,903	157,050,570	13.87	.685
1896	1,264,973,043	187,676,729	14.84	.429
1897	1,089,373,316	152,449,506	13.99	.51
1898	1,132,230,221	158,694,274	14.01	.488
1899	1,193,961,761	218,138,436	18.27	.601
1900	1,217,648,863	228,664,981	18.78	.498
1901	1,241,359,555	236,208,276	19.03	.48
1902	1,290,238,964	251,112,343	19.46	.382
1903	1,597,944,240	312,220,698	19.54	.561
1904	1,545,698,785	282.409,057	18.27	.535
1905	1,624,023,172	281,852,033	17.35	.49
1906	1,595,897,411	269,858.096	16.91	.476
1907	1,878,661,035	335,285,585	17.85	.445
1908	1,990,256,945	329,131,338	16.54	.40
1909	2,438,656,544	365,800,850	15.00	.364
1910	2,373,897,092	332,901,055	14.02	.353
1911	2,602,344,933	393,093,875	15.10	† .05
1912	2,919,855,033	441,353,450	15.11	† .044
1913	3,114,821,281	542,178,904	17.41	† .042
1914	3,232,981,478	543.809,923	16.82	† .039
1915	3,314,492,798	578,775,844	17.46	*
1916	3,577,877,764	765,607,899	21.40	*

NOTE.—The valuations shown in above table are taken from Controller's reports, which always differ from reports made to the State Board of Equalization. The difference is due to errors in additions by the county officials, afterwards corrected when report is made to the Controller.

The very noticeable increase in personal property assessments since 1911 is caused in a great measure by several counties having commenced the assessment of franchises of general mercantile, manufacturing and other corporations not heretofore assessed, in order that refund of bond taxes may be reaped from the state.

†Tax in aid of Panama-Pacific International Exposition.

*No ad valorem tax for any state purpose.

SCHEDULE G.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
Alameda—					
Alameda, 1915	$9,274,000	$6,472,900	$1,414,225	$35,975	$17,197,100
1916	9,690,400	6,524,750	1,354,000	9,975	17,579,125
Albany, 1915	2,003,300	207,650	56,050	1,700	2,268,700
1916	2,000,700	242,025	59,200	------------	2,301,925
Berkeley, 1915	20,482,050	12,235,525	3,103,725	241,764	36,063,064
1916	20,445,825	12,643,900	3,196,396	162,887	36,449,008
Emeryville, 1915	1,831,950	572,550	1,169,455	107,765	3,681,720
1916	1,667,425	584,425	1,163,035	84,346	3,499,231
Hayward, 1915	1,119,150	585,100	214,175	6,275	1,924,700
1916	1,119,900	591,225	195,075	7,475	1,913,675
Livermore, 1915	297,400	355,650	182,725	2,550	838,325
1916	299,775	363,900	188,425	------------	852,100
Oakland, 1915	88,237,975	37,412,575	11,366,547	1,319,294	138,336,391
1916	87,467,200	38,197,975	11,471,320	1,246,481	138,382,976
Piedmont, 1915	4,000,175	1,599,350	578,925	13,412	6,191,862
1916	4,016,325	1,695,325	630,975	9,400	6,352,025
Pleasanton, 1915	200,000	211,025	116,050	7,750	534,825
1916	199,800	203,775	117,900	8,750	530,225
San Leandro, 1915	1,670,700	774,250	243,425	48,010	2,736,385
1916	1,678,575	784,875	190,825	47,900	2,702,175
Amador—					
Amador, 1915	------------	------------	------------	------------	------------
1916	77,750	94,750	27,560	------------	200,060
Jackson, 1915	150,842	363,490	106,518	------------	620,850
1916	150,660	371,500	107,763	------------	629,923
Sutter Creek, 1915	179,032	196,262	70,761	------------	446,055
1916	104,013	190,865	76,335	------------	371,213
Butte—					
Biggs, 1915	36,490	105,195	77,940	------------	219,625
1916	37,210	109,195	107,060	900	254,365
Chico, 1915	722,645	1,113,170	413,350	1,480	2,250,645
1916	722,555	1,115,670	392,285	5,735	2,236,245
Gridley, 1915	102,200	243,620	108,960	------------	454,780
1916	103,390	250,370	119,485	345	473,590
Oroville, 1915	467,675	833,450	348,045	14,690	1,663,860
1916	466,225	854,310	344,860	4,010	1,669,405
Calaveras—					
Angels, 1915	150,305	367,270	139,260	500	657,335
1916	128,230	318,485	90,590	------------	537,305
Colusa—					
Colusa, 1915	300,095	471,025	196,370	12,200	979,690
1916	307,560	477,060	221,601	3,400	1,009,621
Contra Costa—					
Antioch, 1915	204,560	270,065	126,420	------------	601,045
1916	212,320	279,995	118,680	------------	610,995
Concord, 1915	108,760	193,590	52,955	------------	355,305
1916	106,395	197,345	53,330	------------	357,070
Hercules, 1915	133,785	527,370	51,375	96,350	808,880
1916	136,380	596,155	51,300	100,200	884,035
Martinez, 1915	476,215	540,600	274,440	------------	1,291,255
1916	661,655	787,890	476,215	------------	1,925,760
Pinole, 1915	50,240	104,465	16,075	------------	170,780
1916	51,785	99,815	25,590	------------	177,190
Pittsburg, 1915	335,800	381,580	108,650	------------	826,030
1916	323,320	336,835	127,800	------------	787,955
Richmond, 1915	9,961,190	4,764,955	1,491,760	4,305	16,222,210
1916	8,868,470	4,654,565	1,159,450	13,000	14,695,485
Walnut Creek, 1915	162,070	92,865	28,975	------------	283,910
1916	97,070	95,365	21,475	------------	213,910
Del Norte—					
Crescent City, 1915	112,830	135,785	107,995	------------	356,610
1916	120,310	151.440	127.720	------------	399,470

SCHEDULE G—Continued.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916. Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
El Dorado—					
Placerville, 1915	$192,650	$125,945	$108,020	$1,975	$728,590
1916	193,015	438,985	114,295	600	746,895
Fresno—					
Clovis, 1915	208,500	120,265	127,035	1,570	457,370
1916	206,060	122,680	117,500	----------	446,240
Coalinga, 1915	404,620	451,945	203,860	19,735	1,080,160
1916	388,790	398,100	212,865	11,420	1,011,175
Firebaugh, 1915	22,175	27,045	10,965	----------	60,185
1916	22,130	24,890	11,045	----------	58,065
Fowler, 1915	158,220	133,160	53,780	7,010	352,260
1916	155,720	136,750	48,795	2,160	343,425
Fresno, 1915	11,564,495	7,311,475	1,760,075	120,045	20,756,090
1916	11,596,555	7,642,990	1,941,335	101,770	21,282,650
Kingsburg, 1915	161,590	129,305	108,180	9,435	408,510
1916	160,845	145,615	161,035	6,260	473,755
Reedley, 1915	349,645	226,220	132,425	16,895	725,185
1916	337,320	229,700	172,485	13,250	752,755
Sanger, 1915	204,580	167,120	65,050	1,130	437,880
1916	204,495	179,025	118,295	700	502,515
Selma, 1915	359,110	399,260	255,060	----------	1,013,430
1916	351,685	397,280	311,540	2,015	1,062,520
Glenn—					
Orland, 1915	210,735	187,320	45,338	----------	443,393
1916	234,936	207,806	48,299	----------	491,041
Willows, 1915	694,102	495,750	135,275	365	1,325,492
1916	589,957	496,825	131,843	11,350	1,229,975
Humboldt—					
Arcata, 1915	198,525	223,980	115,135	----------	537,640
1916	199,105	227,680	119,175	----------	545,960
Blue Lake, 1915	30,220	53,620	11,020	----------	94,860
1916	29,260	53,025	10,140	----------	92,425
Eureka, 1915	3,839,125	2,087,370	763,578	68,990	6,759,063
1916	3,825,485	2,097,965	733,137	33,645	6,690,232
Ferndale, 1915	198,360	171,180	124,970	4,500	499,010
1916	198,205	169,120	127,245	10,000	504,570
Fortuna, 1915	67,480	102,515	44,595	445	215,035
1916	67,200	102,015	44,935	----------	214,150
Trinidad, 1915	13,885	11,865	5,660	----------	31,410
1916	13,700	11,515	6,730	----------	31,945
Imperial—					
Brawley, 1915	392,800	258,295	186,796	----------	837,891
1916	391,710	262,880	239,073	----------	893,663
Calexico, 1915	666,552	276,415	159,456	----------	1,102,423
1916	675,832	311,825	296,379	----------	1,284,036
El Centro, 1915	1,094,780	765,190	318,908	----------	2,178,878
1916	1,092,015	809,685	393,411	----------	2,295,111
Holtville, 1915	240,884	186,230	108,486	----------	535,600
1916	241,744	190,590	127,893	----------	560,227
Imperial, 1915	346,570	273,720	176,370	----------	796,660
1916	325,315	291,320	234,807	----------	851,442
Inyo—					
Bishop, 1915	360,010	289,575	171,255	1,025	821,865
1916	360,355	290,475	173,225	2,445	826,500
Kern—					
Bakersfield, 1915	3,606,385	3,422,060	1,200,840	2,475	8,231,760
1916	3,575,455	3,452,410	1,254,760	725	8,283,350
Delano, 1915	----------	----------	----------	----------	----------
1916	110,095	54,815	22,520	----------	187,430
Maricopa, 1915	88,940	92,675	110,925	----------	292,540
1916	89,330	89,375	94,200	----------	272,905
McKittrick, 1915	45,205	9,905	30,300	----------	85,410
1916	45,545	11,250	29,750	----------	86,545

SCHEDULE G—Continued.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
Kern—Continued.					
Taft, 1915	$356,190	$184,455	$288,610		$829,255
1916	366,670	179,575	305,680		851,925
Tehachapi, 1915	36,095	48,755	28,185		113,035
1916	35,915	44,965	24,175		105,055
Kings—					
Corcoran, 1915	34,560	78,890	169,575	$700	283,765
1916	34,615	77,920	112,655	925	226,115
Hanford, 1915	707,595	892,600	397,329	18,828	2,016,352
1916	757,620	919,290	374,375	11,780	2,063,065
Lemoore, 1915	116,450	104,495	69,700		290,645
1916	127,920	109,490	74,670		312,080
Lake—					
Lakeport, 1915	286,045	198,775	78,115	5,050	567,985
1916	285,935	205,785	69,765	3,370	564,855
Lassen—					
Susanville, 1915	77,860	264,680	135,665	7,800	486,005
1916	93,306	245,705	116,537	3,929	459,477
Los Angeles—					
Alhambra, 1915	3,577,700	1,915,030	721,320	18,715	6,232,765
1916	4,998,050	1,816,205	707,785	34,915	7,566,955
Arcadia, 1915	2,586,630	210,780	92,985	1,800	2,892,195
1916	3,184,440	211,645	29,505	1,300	3,426,890
Avalon, 1915	729,450	198,925	161,680	800	1,090,855
1916	728,120	102,990	100,607	150	931,867
Azusa, 1915	413,460	201,885	86,735	7,180	709,260
1916	538,125	249,165	99,660	5,900	883,850
Beverly Hills, 1915	1,740,550	361,615	185,565	27,440	2,315,170
1916	2,694,235	432,015	490,575	36,995	3,653,820
Burbank, 1915	534,590	185,915	61,975	600	783,080
1916	1,841,010	357,960	135,135	5,155	2,339,260
Claremont, 1915	709,465	528,605	91,520	280	1,329,870
1916	845,960	551,945	151,130	33,705	1,582,740
Compton, 1915	656,055	118,540	94,970	5,010	874,575
1916	665,350	117,320	106,740	10,280	899,690
Covina, 1915	423,910	329,865	120,540	7,265	881,580
1916	518,200	351,440	105,750	7,690	983,080
Eagle Rock, 1915	1,132,590	415,015	109,545	5,810	1,662,960
1916	1,313,630	369,405	100,265	15,095	1,798,395
El Monte, 1915	238,470	86,165	55,170	970	380,775
1916	317,200	90,285	56,775	2,410	466,670
Glendale, 1915	2,524,795	1,558,065	270,990	20,120	4,373,970
1916	3,293,490	1,504,425	315,370	26,300	5,139,585
Glendora, 1915	463,740	354,290	83,595	5,615	907,240
1916	583,280	397,215	94,570	25,355	1,100,420
Hermosa Beach, 1915	1,574,185	346,265	47,060	3,565	1,971,075
1916	1,702,555	307,645	82,440	14,185	2,086,825
Huntington Park, 1915	604,230	492,415	165,205	5,330	1,267,180
1916	923,260	528,180	64,225	5,335	1,521,000
Inglewood, 1915	1,170,560	399,005	150,315	7,305	1,727,185
1916	1,304,885	368,825	129,994	22,170	1,825,874
Long Beach, 1915	15,607,840	7,655,940	2,060,320	92,140	25,416,240
1916	20,565,570	6,607,255	2,270,980	263,120	29,706,925
Lordsburg, 1915	349,840	215,890	33,125	4,000	602,855
1916	418,870	253,290	69,740	14,680	756,580
Los Angeles, 1915	231,725,335	113,737,090	51,831,885	4,711,615	402,005,925
1916	312,856,860	114,763,385	46,287,080	5,996,350	479,903,675
Manhattan Beach, 1915	1,056,820	104,340	19,640	1,000	1,181,800
1916	1,131,915	94,040	13,680	3,960	1,243,595
Monrovia, 1915	2,072,060	1,024,805	233,265	14,550	3,344,680
1916	2,261,410	890,880	221,610	40,125	3,414,025
Pasadena, 1915	21,221,200	12,741,185	4,818,340	1,896,070	40,676,795
1916	24,769,110	11,639,820	4,803,715	1,740,295	42,952,940

SCHEDULE G—Continued.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
Los Angeles—Continued.					
Pomona, 1915	$3,958,215	$2,836,820	$642,555	$44,015	$7,481,605
1916	4,877,060	2,689,680	753,300	60,020	8,380,060
Redondo Beach, 1915	2,536,720	770,960	302,755	5,645	3,616,080
1916	2,637,735	649,980	290,080	10,760	3,588,555
San Fernando, 1915	485,980	301,490	99,605	640	887,715
1916	631,255	321,125	119,785	3,485	1,075,650
San Gabriel, 1915	920,420	276,760	86,190	12,650	1,296,020
1916	1,315,140	294,380	83,380	12,665	1,705,565
San Marino, 1915	2,169,740	682,250	363,285	4,150	3,219,425
1916	2,500,050	720,490	343,820	4,010	3,568,370
Santa Monica, 1915	7,302,370	2,887,540	977,900	30,475	11,198,285
1916	8,300,180	2,629,820	897,820	57,700	11,885,520
Sawtelle, 1915	661,530	322,690	98,815	5,440	1,088,475
1916	964,035	226,270	91,510	10,270	1,292,085
Sierra Madre, 1915	977,790	487,750	75,090	20,575	1,561,205
1916	1,101,000	403,270	60,075	610	1,564,955
South Pasadena, 1915	3,096,170	2,072,665	662,075	454,020	6,284,930
1916	3,967,195	1,869,780	666,905	82,150	6,586,030
Tropico, 1915	628,030	366,860	81,240	2,030	1,078,160
1916	833,810	356,795	140,235	455	1,331,295
Venice, 1915	4,934,385	2,521,620	436,330	21,415	7,913,750
1916	5,738,565	1,581,390	395,835	6,025	7,721,815
Vernon, 1915	1,743,990	264,195	697,915	59,090	2,765,190
1916	2,215,090	422,510	760,420	73,065	3,471,085
Watts, 1915	749,860	187,670	36,370	38,825	1,012,725
1916	860,110	259,020	34,740	2,125	1,155,995
Whittier, 1915	1,786,940	957,590	353,930	37,165	3,135,625
1916	2,012,215	1,029,905	357,360	66,435	3,465,915
Madera—					
Madera, 1915	487,240	427,990	218,945	600	1,134,775
1916	555,630	432,735	221,064	78	1,209,507
Marin—					
Belvedere, 1915	258,675	236,300	67,015	50	562,070
1916	257,175	245,650	59,260	6,060	568,145
Corte Madera, 1915	----------	----------	----------	----------	----------
1916	239,480	107,500	7,685	----------	354,665
Larkspur, 1915	389,235	163,250	16,790	----------	569,275
1916	395,595	172,110	17,040	----------	584,745
Mill Valley, 1915	770,040	626,160	47,460	65	1,443,725
1916	798,310	641,880	57,330	465	1,497,985
Ross, 1915	577,910	433,965	213,415	----------	1,225,290
1916	579,145	414,665	227,355	1,660	1,252,825
San Anselmo, 1915	794,200	544,430	45,970	----------	1,384,600
1916	824,125	587,095	62,485	200	1,473,905
San Rafael, 1915	2,180,130	1,981,250	280,105	2,530	4,444,015
1916	2,189,475	1,864,835	423,995	160	4,478,465
Sausalito, 1915	784,490	581,955	62,130	420	1,428,995
1916	798,115	594,535	68,555	500	1,461,705
Mendocino—					
Fort Bragg, 1915	286,655	230,625	239,289	582	757,151
1916	287,185	244,175	245,225	----------	776,585
Point Arena, 1915	65,850	53,320	43,170	700	163,040
1916	65,850	55,020	43,540	----------	164,410
Potter Valley, 1915	382,850	56,120	62,196	1,800	502,966
1916	380,370	56,670	70,093	710	507,843
Ukiah, 1915	440,185	559,985	210,635	27,462	1,238,267
1916	441,715	561,185	197,320	24,676	1,224,896
Willits, 1915	195,020	226,120	162,475	2,450	586,065
1916	196.130	224,240	138,360	2,425	561,155

SCHEDULE G—Continued.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
Merced—					
Gustine, 1915	------	------	------	------	------
1916	$74,050	$73,230	$52,880	------	$200,160
Los Banos, 1915	141,015	166,465	121,475	------	428,955
1916	204,265	174,025	139,800	------	518,090
Merced, 1915	627,635	789,915	302,590	------	1,720,140
1916	623,085	795,645	290,185	------	1,708,915
Modoc—					
Alturas, 1915	108,195	210,605	91,964	$5,940	416,704
1916	108,740	219,015	91,985	2,550	421,890
Monterey—					
King City, 1915	156,600	157,055	84,141	------	397,796
1916	157,790	129,790	100,863	------	388,443
Monterey, 1915	1,339,160	739,645	286,960	------	2,365,765
1916	1,324,612	786,240	286,998	------	2,397,850
Pacific Grove, 1915	1,053,013	696,963	121,509	------	1,871,485
1916	1,027,010	728,470	120,527	------	1,876,007
Salinas, 1915	1,050,640	842,930	308,027	------	2,201,597
1916	1,041,385	884,440	355,618	500	2,281,943
Napa—					
Calistoga, 1915	212,370	245,450	106,705	200	564,725
1916	222,495	262,675	102,435	1,850	589,455
Napa, 1915	1,455,675	1,905,675	734,135	46,050	4,141,535
1916	1,621,650	1,959,800	811,300	38,400	4,431,150
St. Helena, 1915	476,110	606,350	261,395	4,470	1,348,325
1916	482,495	612,700	255,145	2,855	1,353,195
Nevada—					
Grass Valley, 1915	293,845	737,545	199,915	5,285	1,236,590
1916	302,930	738,795	213,485	6,330	1,261,540
Nevada City, 1915	150,888	481,260	147,820	9,480	789,445
1916	150,415	478,255	152,250	15,900	796,820
Orange—					
Anaheim, 1915	661,570	632,825	99,605	------	1,394,000
1916	932,165	667,035	94,300	------	1,693,500
Fullerton, 1915	1,895,635	536,815	97,035	------	2,529,485
1916	1,932,060	562,810	461,665	2,900	2,959,435
Huntington Beach, 1915	687,995	195,060	57,000	------	940,055
1916	681,510	227,285	63,425	------	972,220
Newport Beach, 1915	541,060	279,015	39,235	3,015	862,325
1916	543,005	287,465	49,005	400	879,875
Orange, 1915	734,175	743,510	192,460	2,800	1,672,945
1916	858,885	798,590	178,375	1,500	1,837,350
Santa Ana, 1915	3,349,430	2,363,005	446,935	240	6,159,610
1916	3,484,070	2,376,665	406,490	13,675	6,280,900
Seal Beach, 1915	------	------	------	------	------
1916	455,705	59,360	5,155	------	520,220
Stanton, 1915	294,090	32,010	16,855	------	342,955
1916	293,005	33,375	13,535	------	339,915
Placer—					
Auburn, 1915	334,510	488,430	93,860	1,600	918,400
1916	305,430	519,470	86,740	1,600	913,240
Colfax, 1915	37,050	114,830	18,685	------	170,565
1916	36,600	100,385	18,395	------	155,380
Lincoln, 1915	132,505	330,805	102,860	------	566,170
1916	121,800	327,815	97,585	7,500	554,700
Rocklin, 1915	64,470	93,530	11,860	------	169,860
1916	38,280	59,040	10,835	------	108,155
Roseville, 1915	414,020	409,040	32,220	1,950	857,230
1916	380,775	422,740	56,560	1,900	861,975
Riverside—					
Banning, 1915	279,850	200,545	50,335	------	530,730
1916	280,960	205,910	68,890	------	555,740

SCHEDULE G—Continued.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
Riverside—Continued.					
Beaumont, 1915	$132,270	$113,835	$37,565	------------	$283,670
1916	137,650	113,510	36,850	------------	288,010
Corona, 1915	1,011,425	826,030	126,745	------------	1,964,200
1916	1,092,710	895,250	185,010	------------	2,172,970
Elsinore, 1915	176,250	78,885	21,485	------------	276,620
1916	154,900	82,750	24,170	------------	261,820
Hemet, 1915	327,590	236,580	55,565	------------	619,735
1916	313,660	257,670	84,470	------------	655,800
Perris, 1915	49,220	57,580	14,025	------------	120,825
1916	51,220	60,010	46,820	------------	158,050
Riverside, 1915	4,669,760	3,869,170	639,520	------------	9,178,450
1916	4,468,350	4,258,550	970,870	------------	9,697,770
San Jacinto, 1915	170,970	120,660	36,120	------------	327,750
1916	159,570	121,150	45,360	------------	326,080
Sacramento—					
Sacramento, 1915	35,738,710	17,636,560	*6,069,450	------------	59,444,720
1916	35,124,600	16,884,800	*6,190,400	------------	58,199,800
San Benito—					
Hollister, 1915	506,230	613,300	190,150	------------	1,309,680
1916	557,255	615,380	245,805	------------	1,418,440
San Juan, 1915	37,235	48,965	13,185	------------	99,385
1916	41,325	49,515	19,190	------------	110,030
San Bernardino—					
Chino, 1915	424,250	461,420	111,305	------------	996,975
1916	424,550	467,235	110,650	------------	1,002,435
Colton, 1915	747,980	514,460	133,292	------------	1,395,732
1916	714,340	497,290	168,460	------------	1,380,090
Needles, 1915	144,330	315,925	86,825	------------	547,080
1916	195,035	230,775	156,075	$600	582,485
Ontario, 1915	1,609,230	1,065,455	186,675	200	2,861,560
1916	1,612,820	1,071,435	204,130	725	2,889,110
Redlands, 1915	3,089,385	2,656,450	478,260	8,175	6,232,270
1916	3,117,3 5	2,751,355	494,455	11,330	6,374,485
Rialto, 1915	346,865	278,425	56,559	300	682,149
1916	355,190	276,430	61,965	7,980	701,565
San Bernardino, 1915	3,165,870	2,111,955	496,515	3,900	5,778,240
1916	3,040,080	2,042,940	383,675	1,850	5,468,545
Upland, 1915	1,047,155	642,485	113,537	5,400	1,808,577
1916	1,022,760	644,135	116,120	5,650	1,788,665
San Diego—					
Chula Vista, 1915	381,994	111,060	50,730	300	544,084
1916	374,960	112,600	52,269	1,030	540,859
Coronado, 1915	1,149,035	496,955	176,300	3,940	1,826,230
1916	1,151,740	517,335	320,202	43,890	2,033,167
East San Diego, 1915	887,158	208,160	23,556	------------	1,118,874
1916	909,840	218,650	43,990	6,940	1,179,420
El Cajon, 1915	89,875	47,455	20,990	------------	158,320
1916	90,770	52,570	41,685	4,080	189,105
Escondido, 1915	179,160	146,615	167,640	2,100	495,515
1916	174,460	149,350	175,750	2,260	501,820
La Mesa, 1915	199,955	90,110	36,724	950	327,739
1916	199,520	93,130	34,420	2,160	329,230
National City, 1915	1,157,145	218,390	89,572	770	1,465,877
1916	1,159,745	222,490	46,330	1,060	1,429,625
Oceanside, 1915	188,705	70,940	35,894	1,490	297,029
1916	188,770	71,480	51,794	2,040	314,084
San Diego, 1915	38,822,360	8,383,855	4,660,543	130,275	51,197,035
1916	39,340,569	8,607,485	4,569,132	972,040	53,489,226
San Joaquin—					
Lodi, 1915	436,890	939,940	315,590	30,390	1,722,810
1916	463,295	1,006,065	363,015	27,610	1,859,985
Stockton, 1915	9,901,394	9,143,307	3,831,461	98,416	22,974,578
1916	10,117,199	9,581,195	4,035,856	175,280	23,909,530
Tracy, 1915	191,960	284,990	149,283	8,838	635,071
1916	201,675	296,540	150,952	17,462	666,629

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*Includes money and solvent credits.

SCHEDULE G—Continued.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
San Luis Obispo—					
Arroyo Grande, 1915	$118,485	$132,080	$35,087	--------------	$285,652
1916	117,220	130,760	52,659	--------------	300,639
Paso Robles, 1915	183,495	340,115	194,350	$650	718,610
1916	180,270	341,495	160,140	--------------	681,905
San Luis Obispo, 1915	690,870	1,308,095	506,100	3,944	2,509,009
1916	685,665	1,327,700	467,733	--------------	2,481,098
San Mateo—					
Burlingame, 1915	1,283,650	674,360	78,415	--------------	2,036,425
1916	1,285,760	754,655	51,470	1,500	2,093,385
Daly City, 1915	493,790	254,975	33,990	--------------	782,755
1916	480,515	297,320	9,950	--------------	787,785
Hillsborough, 1915	2,233,675	859,950	333,185	153,000	3,579,810
1916	2,260,725	1,058,675	322,405	153,000	3,794,805
Redwood City, 1915	872,120	595,190	135,405	--------------	1,602,715
1916	894,320	716,933	117,995	--------------	1,729,248
San Bruno, 1915	597,785	256,925	26,280	--------------	880,990
1916	596,385	256,330	20,385	--------------	873,100
San Mateo, 1915	2,060,750	1,026,415	188,520	--------------	3,275,685
1916	1,907,855	1,274,450	156,675	--------------	3,338,980
South San Francisco, 1915	538,650	385,780	234,300	--------------	1,158,730
1916	533,615	267,270	452,815	--------------	1,253,700
Santa Barbara—					
Lompoc, 1915	273,115	253,290	82,780	--------------	609,185
1916	278,050	243,690	86,255	--------------	607,995
Santa Barbara, 1915	3,577,230	4,244,420	704,110	7,650	8,533,410
1916	3,724,460	4,491,475	806,010	10,200	9,032,145
Santa Maria, 1915	383,600	489,200	116,290	--------------	989,090
1916	382,850	486,075	115,835	--------------	984,760
Santa Clara—					
Alviso, 1915	168,425	32,295	22,635	840	224,195
1916	168,745	32,240	24,395	540	225,920
Gilroy, 1915	308,685	362,745	182,390	8,250	862,070
1916	340,180	436,780	195,090	10,035	982,085
Los Gatos, 1915	515,110	598,500	123,095	600	1,237,305
1916	515,475	603,820	121,705	400	1,241,400
Mayfield, 1915	378,525	143,805	14,780	1,100	538,210
1916	376,780	141,600	23,255	2,180	543,815
Morgan Hill, 1915	123,665	92,880	26,155	710	243,410
1916	123,055	94,175	25,705	2,725	245,660
Mountain View, 1915	251,470	291,115	86,885	1,200	630,670
1916	250,045	297,335	79,405	100	626,885
Palo Alto, 1915	1,523,800	1,721,715	283,210	14,430	3,543,155
1916	1,518,145	1,760,020	318,340	10,045	3,606,550
San Jose, 1915	13,901,945	9,332,850	2,361,720	283,255	25,879,770
1916	13,998,780	9,329,710	2,201,875	213,970	25,744,335
Santa Clara, 1915	864,905	1,009,585	372,945	62,775	2,310,210
1916	865,525	1,025,260	400,490	61,450	2,352,725
Sunnyvale, 1915	383,460	249,125	151,400	--------------	783,985
1916	390,890	289,915	138,265	--------------	819,070
Santa Cruz—					
Santa Cruz, 1915	4,245,410	2,286,260	570,065	3,295	7,105,030
1916	4,241,860	2,257,400	567,365	3,605	7,070,230
Watsonville, 1915	1,124,825	1,004,125	475,670	5,930	2,610,550
1916	1,126,165	1,018,835	483,705	865	2,629,570
Shasta—					
Coram, 1915	2,880	3,925	--------------	--------------	6,805
1916	2,765	3,625	--------------	--------------	6,390
Kennett, 1915	39,840	128,445	41,310	--------------	209,595
1916	41,950	144,330	57,120	--------------	243,400
Redding, 1915	462,310	754,190	290,960	--------------	1,507,460
1916	516,835	702,155	346,555	--------------	1,565,545
Sierra—					
Loyalton, 1915	117,190	147,135	69,300	--------------	333,625
1916	113,835	121,915	47,560	--------------	283,310

SCHEDULE G—Continued.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
Siskiyou—					
Dorris, 1915	$43,115	$46,185	$23,590		$112,890
1916	45,865	48,060	39,944		133,869
Dunsmuir, 1915	84,285	288,925	86,155		459,365
1916	89,930	290,205	79,812		459,947
Etna Mills, 1915	53,230	128,980	77,640		259,850
1916	53,870	128,530	67,125		249,525
Fort Jones, 1915	27,195	120,620	71,535	$8,920	228,270
1916	26,690	89,245	68,163		184,098
Montague, 1915	64,385	95,675	51,970	26,250	238,280
1916	71,930	96,735	45,935	9,800	224,400
Sisson, 1915	72,120	112,850	53,730	2,000	240,700
1916	71,700	106,535	55,140	135	233,510
Yreka, 1915	136,295	356,075	156,392	7,700	656,462
1916	137,345	362,325	161,209	3,200	664,079
Solano—					
Benicia, 1915	258,220	385,615	130,015	100	773,950
1916	258,630	392,450	148,900		799,980
Dixon, 1915	101,080	289,680	133,064	9,000	532,824
1916	110,100	316,230	128,825	9,000	564,155
Fairfield, 1915	52,740	162,840	50,345	3,605	269,530
1916	63,080	165,010	49,985	3,482	281,557
Rio Vista, 1915	54,975	207,665	66,175	500	329,315
1916	55,980	215,015	100,246	500	371,741
Suisun, 1915	114,445	221,030	98,370	500	434,345
1916	113,455	222,300	90,975	500	427,230
Vacaville, 1915	139,785	289,195	95,045		524,025
1916	136,065	300,350	111,430		547,845
Vallejo, 1915	1,491,395	1,922,680	601,815	660	4,016,550
1916	1,495,060	1,968,635	646,715	660	4,111,070
Sonoma—					
Cloverdale, 1915	114,095	188,845	46,000		348,940
1916	115,510	185,130	46,950	41,870	389,460
Healdsburg, 1915	311,640	476,970	203,085		991,695
1916	309,970	483,740	204,450		998,160
Petaluma, 1915	1,290,070	1,506,330	729,930	74,630	3,600,960
1916	1,295,370	1,528,480	692,690	65,900	3,582,440
Santa Rosa, 1915	2,079,345	2,346,050	810,685	47,010	5,283,090
1916	2,071,965	2,365,245	805,095	18,315	5,260,620
Sebastopol, 1915	197,885	365,460	151,395		714,740
1916	195,725	370,440	125,610		691,775
Sonoma, 1915	168,970	257,705	85,050		511,725
1916	167,645	251,690	80,105		499,440
Stanislaus—					
Modesto, 1915	1,159,445	1,395,065	606,730	58,050	3,219,290
1916	1,148,355	1,414,430	596,455	53,230	3,212,470
Newman, 1915	165,100	196,640	157,840	1,050	520,630
1916	165,095	221,800	132,670	300	519,865
Oakdale, 1915	187,085	247,930	133,420	4,040	572,475
1916	186,995	259,135	124,630	6,885	577,645
Turlock, 1915	517,745	459,785	240,015	22,250	1,239,795
1916	508,365	480,215	247,620	37,045	1,273,250
Sutter—					
Yuba City, 1915	199,875	251,105	79,425		530,405
1916	197,180	252,955	79,620		529,755
Tehama—					
Corning, 1915	177,990	311,830	140,900	7,850	638,570
1916	179,920	319,025	124,020	10,365	633,330
Red Bluff, 1915	439,130	863,290	382,575	25,075	1,710,070
1916	445,860	884,565	373,135	29,860	1,733,425
Tehama, 1915	35,825	43,175	52,490	1,000	132,490
1916	35,445	43,955	38,265	1,300	118,965

SCHEDULE G—Concluded.

Assessment of Municipalities (Incorporated Cities and Towns) by County Assessors for the Years 1915 and 1916, Exclusive of Operative Property of Corporations Exempt from Local Taxation.

NOTE.—Upper figures, 1915 ; lower, 1916.

Counties and cities	Value of real estate	Improvements thereon	Personal property	Money and solvent credits	Total
Tulare—					
Dinuba, 1915	$146,305	$245,940	$147,105	$1,200	$540,550
1916	149,780	261,430	181,235	6,230	598,675
Exeter, 1915	132,990	212,230	74,240	260	419,720
1916	131,515	211,630	65,590	--------------	408,735
Lindsay, 1915	498,310	434,370	154,435	520	1,087,635
1916	493,420	451,335	172,200	--------------	1,116,955
Porterville, 1915	540,690	537,385	205,775	--------------	1,283,850
1916	553,460	565,265	229,990	--------------	1,348,715
Tulare, 1915	571,350	491,870	246,890	1,000	1,314,110
1916	597,140	539,725	255,615	14,130	1,406,610
Visalia, 1915	1,000,225	1,203,520	414,245	4,710	2,622,700
1916	1,004,610	1,135,740	392,420	3,000	2,535,770
Tuolumne—					
Sonora, 1915	270,400	584,685	200,047	2,296	1,057,428
1916	272,310	580,095	198,978	1,296	1,053,079
Ventura—					
Fillmore, 1915	239,840	164,290	74,050	--------------	478,180
1916	238,740	179,360	71,400	--------------	489,500
Oxnard, 1915	894,540	404,850	388,889	--------------	1,688,279
1916	698,360	510,220	490,275	--------------	1,698,855
San Buenaventura, 1915	805,860	517,950	302,425	3,060	1,629,295
1916	806,310	526,000	352,300	3,000	1,687,610
Santa Paula, 1915	488,310	385,750	144,635	120	1,018,815
1916	485,350	393,680	156,470	--------------	1,035,500
Yolo—					
Winters, 1915	158,800	187,595	120,135	900	467,430
1916	158,785	190,565	87,720	--------------	437,070
Woodland, 1915	670,505	1,326,165	431,490	4,500	2,432,660
1916	668,275	1,335,365	373,065	6,000	2,382,705
Yuba—					
Marysville, 1915	825,280	1,283,560	644,145	6,010	2,758,995
1916	814,380	1,295,145	648,420	5,740	2,763,685
Wheatland, 1915	33,850	90,690	50,275	--------------	174,815
1916	36,270	94,555	43,995	7,595	182,415
Totals, 1915	$679,135,386	$371,964,002	$137,345,408	$11,339,761	$1,199,784,557
1916	781,483,928	373,813,729	134,884,557	12,845,127	1,303,027,341

SCHEDULE H.

Showing Certain Kinds of Personal Property Assessed, and the Assessed Value for 1916.

County	Cattle		Hogs		Mules	
	Number	Value	Number	Value	Number	Value
Alameda		$458,300		$16,100		$3,000
Alpine	1,142	24,370	77	308	4	100
Amador	13,556	244,420	1,679	6,140	120	6,460
Butte	21,750	435,000	7,600	23,600	2,070	124,200
Calaveras	18,400	315,506	1,600	4,800	100	7,500
Colusa	18,343	348,035	17,157	50,055	3,554	200,305
Contra Costa	31,850	796,250	15,750	55,125	1,160	58,000
Del Norte	6,200	111,600	400	800	4	200
El Dorado	8,400	168,000	850	4,250	325	13,000
Fresno	24,580	614,500	6,225	24,900	3,780	226,800
Glenn	42,638	598,175	15,440	53,038	2,182	148,670
Humboldt	52,740	685,620	3,926	10,620	3,010	10,540
Imperial	61,920	1,857,600	48.262	193,048	2,962	148,100
Inyo	20,488	486,330	3,144	12,348	533	17,875
Kern	90,500	1,629,000			2,200	110,000
Kings	35,449	716,810		60,270	1,078	53,900
Lake	6,850	121,300	4,350	10,875	315	12,600
Lassen	29,736	551,960	3,363	11,059	1,037	34,010
Los Angeles	28,168	829,830	12,832	47,510	5,218	265,355
Madera	27,797	471,940		19,195	3,091	136,565
Marin	15,900	497,500	2.500	10,000		
Mariposa	12,100	205,700	3,500	8,750	400	16,400
Mendocino	21,967	439,340	5,980	17,940	481	14,430
Merced	46,600	932,000	3,720	18,500	1,670	83,500
Modoc	48,360	736,235	5,830	12,117	895	48.362
Mono	5,282	95,670	152	1,070	75	3,740
Monterey	75,000	1,500,000	7,000	21,000	300	12,000
Napa	22,941	688,230	4,465	22,325	1,290	64,500
Nevada	7,230	108,450	483	2,415	24	1,200
Orange	14,850	445,500	700	2,100	3,000	375,000
Placer	6.500	130,000	1,000	5,000	300	1,500
Plumas	8,898	220,485	513	2,970	111	6,075
Riverside	11,682	202,050	6,611	25,825	1,423	66,105
Sacramento	7,500	187,500	3,000	15,000	250	10,000
San Benito	26,959	550,600	5,834	16,110	113	4,125
San Bernardino	11,134	167,010	2,882	14,410	814	40,700
San Diego	22,240	336,170	9,130	22,620	1,520	61,700
San Francisco						
San Joaquin		601,042		50,161		111,310
San Luis Obispo	103,250	1,806,875	17,222	51,675	740	37,000
San Mateo		175,500		3,800		2,400
Santa Barbara	9,700	154,715	5,900	23,600	820	41,000
Santa Clara	33,710	809,040	7,926	39,630	397	20,245
Santa Cruz		108,580	696	6,965	65	1,300
Shasta	30,122	428,570	4,877	18,545	356	13,500
Sierra	2,000	30,000	50	200	50	5,200
Siskiyou	36,543	825,871	5,572	17,050	238	13,775
Solano		309,510		18,810		111,230
Sonoma	58,860	1,471,500	1,730	8,650	390	15,600
Stanislaus	69,037	1,532,935		61,435	4,027	187,915
Sutter	7,441	163,435	6,456	21,820	1,336	71,250
Tehama	27,465	549,340	6,735	26,940	1,373	89,245
Trinity	9,439	141,585	1,360	4,080	195	5,545
Tulare	74,720	1,308,600	6,720	40,320	4,423	265.380
Tuolumne	13,620	136,200		4,320	100	5,000
Ventura	15,180	227,700	5,850	11,700	1,280	89,600
Yolo		308,630		51,860		145,675
Yuba	6,100	91,500	2,500	7,500	300	22,500
Totals		$30,088,114		$1,294,274		$3,641,187

SCHEDULE H—Continued.

Showing Certain Kinds of Personal Property Assessed, and the Assessed Value for 1916.

County	Horses		Sheep		Goats	
	Number	Value	Number	Value	Number	Value
Alameda	------------	$178,500	------------	$61,200	------------	$500
Alpine	156	6,565	5,185	10,100	------------	------------
Amador	2,086	78,803	312	825	210	415
Butte	7,100	390.500	24,000	72,000	750	1,875
Calaveras	2,600	96,000	15,000	37,500	2,500	3,750
Colusa	4,602	173,440	23,500	70,005	98	115
Contra Costa	18,340	653,600	21,500	64,500	------------	------------
Del Norte	450	22,500	100	150	------------	------------
El Dorado	2,600	104,000	7,000	14,000	2,000	3,000
Fresno	10,230	306,900	72,860	182,150	------------	------------
Glenn	3,355	153,865	73.258	220,827	600	900
Humboldt	6,024	201,865	59.250	88,875	3,010	4,515
Imperial	10,478	523,900	35,843	71,686	------------	------------
Inyo	4,401	163,277	19,818	79,272	900	1,800
Kern	------------	325,000	270,000	675,000	------------	------------
Kings	7,425	344,525	57,238	118,540	------------	------------
Lake	2,150	107,500	6,900	13,800	2,180	2,180
Lassen	7,471	205,985	53,349	160,047	100	300
Los Angeles	20,601	882.180	10 865	22,450	2,333	8,125
Madera	4,139	150,015	5,584	10,585	406	810
Marin	2,000	100,000	4,500	13,500	300	600
Mariposa	1,600	56,000	6,000	15,600	400	729
Mendocino	5,089	203,560	63 073	126,146	2,966	4,499
Merced	6,980	279.200	48,900	122,250	7,200	14,400
Modoc	10,825	364,295	62,100	155,250	265	665
Mono	922	44,670	8,643	23,050	20	30
Monterey	2,500	75,000	25,000	75,000	1,000	3,000
Napa	10,674	426,960	10,685	32,055	638	1,276
Nevada	1,793	84,270	4,430	8,860	474	710
Orange	9,050	905,060	------------	------------	------------	------------
Placer	2,500	100,000	25,000	50,000	750	750
Plumas	1,700	110.365	1,189	3,205	------------	------------
Riverside	5,720	195 205	2,127	3,590	2,169	3,160
Sacramento	9,000	450,000	9,500	28,500	100	300
San Benito	4,436	194,240	10,948	32,845	303	375
San Bernardino	5,556	138,900	260	390	312	470
San Diego	8,005	230,630	1,700	5,100	240	240
San Francisco	------------	------------	------------	------------	------------	------------
San Joaquin	------------	670,180	------------	70,700	------------	220
San Luis Obispo	12,250	551,250	25,000	50,000	3,750	5,625
San Mateo	------------	75,000	------------	4,400	------------	------------
Santa Barbara	4,450	267,000	12,325	24,650	------------	------------
Santa Clara	12,842	860,410	2,400	9,600	874	2,625
Santa Cruz	------------	113,330	------------	1,125	500	1,250
Shasta	4,434	153,410	6,448	16,465	3,921	5,640
Sierra	1,000	25,000	400	500	50	100
Siskiyou	5,182	273,713	21,075	52,687	44	114
Solano	------------	481,640	------------	111,800	------------	------------
Sonoma	11,730	469,200	28,770	57,540	3,680	6,340
Stanislaus	12,306	493,410	19,417	36,615	383	790
Sutter	3,419	156,420	30,300	65,210	3	15
Tehama	4,231	211,550	134,500	471,250	7,280	10,920
Trinity	1,253	42,085	1,598	3,965	355	710
Tulare	13,490	674,500	2,610	6,520	450	900
Tuolumne	2,000	80,000	500	1,500	1,200	2,400
Ventura	3,378	202,600	7,250	11,870	750	1,500
Yolo	------------	215,150	------------	128,320	------------	------------
Yuba	2,000	100,000	17,340	34,770	------------	------------
Totals	------------	$15,243,063	------------	$3,828,340	------------	$98,629

SCHEDULE H—Concluded.

Showing Certain Kinds of Personal Property Assessed, and the Assessed Value for 1916.

County	Poultry		Automobiles	
	Dozens	Value	Number	Value
Alameda	------------	$77,400	6,400	$2,050,000
Alpine	49	147	15	2,325
Amador	------------	------------	239	72,225
Butte	3,500	10,500	1,033	309,900
Calaveras	1,000	2,500	100	40,000
Colusa	1,216	4,085	452	112,805
Contra Costa	9,000	22,500	980	343,000
Del Norte	------------	------------	90	18,000
El Dorado	1,500	7,500	200	80,000
Fresno	24,212	72,636	5,260	1,315,320
Glenn	3,911	12,588	380	67,563
Humboldt	3,150	7,875	1,050	262,625
Imperial	11,446	22,892	1,646	411,500
Inyo	1,643	8,076	208	58,735
Kern	------------	------------	2,250	405,000
Kings	5,076	15,230	825	161,900
Lake	2,200	6,600	241	63,710
Lassen	1,268	2,536	230	63,539
Los Angeles	27,741	90,085	40,962	10,785,105
Madera	622	1,865	361	70,265
Marin	5,200	15,600	820	328,000
Mariposa	350	1,050	208	87,360
Mendocino	3,243	9,729	458	117,248
Merced	6,740	20,220	729	127,575
Modoc	1,500	3,750	207	46,500
Mono	163	815	24	6,800
Monterey	2,500	7,500	980	392,000
Napa	6,830	27,320	724	289,600
Nevada	1,020	4,080	280	98,000
Orange	13,000	52,000	4,245	1,618,000
Placer	650	1,625	550	16,500
Plumas	471	1,710	102	29,125
Riverside	4,456	8,920	2,173	461,798
Sacramento	21,000	84,000	4,008	1,102,200
San Benito	6,218	15,545	440	136,270
San Bernardino	18,321	54,963	3,662	573,460
San Diego	6,910	20,610	9,171	277,370
San Francisco	------------	------------	11,510	3,518,400
San Joaquin	------------	22,604	3,104	802,836
San Luis Obispo	7,310	21,930	690	138,000
San Mateo	------------	9,000	1,139	371,325
Santa Barbara	3,120	9,360	2,390	1,003,800
Santa Clara	45,320	135,960	3,021	920,875
Santa Cruz	------------	22,900	847	183,905
Shasta	1,066	3,130	224	50,655
Sierra	50	500	57	22,400
Siskiyou	1,148	2,870	359	108,805
Solano	------------	11,375	780	299,125
Sonoma	17,320	51,960	2,243	672,900
Stanislaus	12,301	37,220	2,254	425,560
Sutter	3,447	11,625	344	93,085
Tehama	1,774	4,435	480	191,615
Trinity	526	2.630	49	11,850
Tulare	4,120	8,240	2,310	877,800
Tuolumne	1,000	3,000	262	81,335
Ventura	------------	------------	1,622	421,700
Yolo	------------	8,625	1,263	252,600
Yuba	3,000	6,000	400	100,000
Totals	------------	$1,067,816	127,051	$32,949,924

SCHEDULE I.

Number of Fruit Trees Growing in Spring of 1916.

County	Apple		Apricot		Cherry	
	Bearing	Nonbearing	Bearing	Nonbearing	Bearing	Nonbearing
Alameda	52,000	800	126,000	1,000	81,000	2,100
Alpine	710	------------	------------	6	61	------------
Amador	1,532	830	1,365	60	710	100
Butte	13,000	28,000	7,000	900	1,500	3,200
Calaveras	6,000	500	2,000	100	500	100
Colusa	500	------------	3,200	------------	100	------------
Contra Costa	87,500	850	47,200	2,150	16,730	5,280
Del Norte	4,000	1,600	------------	------------	------------	------------
El Dorado	11,925	2,249	600	108	6,685	2,389
Fresno	18,540	2,000	10,200	------------	------------	------------
Glenn	5,900	3,624	6,314	4,100	500	750
Humboldt	108,000	1,500	200	------------	2,150	750
Imperial	------------	------------	10,700	7,078	------------	72
Inyo	54,000	60,000	1,100	50	100	75
Kern	15,000	160,000	22,000	23,500	1,200	3,000
Kings	------------	------------	164,100	14,400	------------	------------
Lake	19,539	1,223	2,214	149	737	------------
Lassen	8,600	4,477	365	394	2,700	736
Los Angeles	30,192	11,794	47,727	26,973	7,960	17,817
Madera	5,008	3,729	10,832	2,239	------------	------------
Marin	------------	------------	------------	------------	------------	------------
Mariposa	20,000	10,000	500	------------	200	------------
Mendocino	450	665	25	45	50	25
Merced	5,000	2,500	25,000	8,543	750	625
Modoc	25,000	16,500	575	375	1,100	1,800
Mono	------------	------------	------------	------------	------------	------------
Monterey	100,000	10,000	12,000	10,000	3,000	2,500
Napa	76,700	44,960	29,190	11,700	44,850	24,455
Nevada	12,630	3,400	150	------------	325	100
Orange	12,325	5,000	8,600	6,000	------------	------------
Placer	17,500	2,400	7,600	200	29,210	3,260
Plumas	3,250	3,200	------------	------------	150	400
Riverside	58,430	175,310	211,580	269,300	2,900	33,400
Sacramento	10,300	1,500	23,500	500	14,000	3,000
San Benito	19,500	500	75,000	30,000	3,000	------------
San Bernardino	62,900	327,500	165,200	83,000	4,300	8,000
San Diego	23,600	4,070	8,540	1,500	1,200	------------
San Francisco	------------	------------	------------	------------	------------	------------
San Joaquin	6,198	518	17,680	2,461	13,602	2,526
San Luis Obispo	80,000	50,000	60,000	35,000	2,000	1,100
San Mateo	45,125	7,140	9,640	325	1,275	------------
Santa Barbara	10,000	------------	11,240	1,500	650	------------
Santa Clara	28,000	31,000	599,000	32,000	197,000	200,000
Santa Cruz	605,234	98,489	45,140	23,283	15,400	8,330
Shasta	3,500	1,500	800	------------	500	------------
Sierra	6,200	290	------------	------------	245	38
Siskiyou	1,250	------------	------------	------------	325	------------
Solano	3,500	------------	245,700	------------	99,000	------------
Sonoma	258,750	42,270	25,220	6,070	46,780	7,210
Stanislaus	7,200	------------	35,300	13,200	8,400	1,000
Sutter	6,696	------------	1,825	------------	2,729	------------
Tehama	16,915	------------	46,440	------------	5,315	------------
Trinity	8,000	3,000	200	150	600	250
Tulare	13,800	------------	17,000	------------	------------	------------
Tuolumne	15,000	13,000	177	200	164	500
Ventura	3,874	1,650	314,589	256,000	285	------------
Yolo	2,000	------------	126,400	------------	1,000	------------
Yuba	8,500	2,500	12,000	2,000	500	250
Totals	2,019,273	1,142,038	2,598,928	879,559	623,438	335,138

SCHEDULE I—Continued.

Number of Fruit Trees Growing in Spring of 1916.

County	Fig		Olive		Peach	
	Bearing	Nonbearing	Bearing	Nonbearing	Bearing	Nonbearing
Alameda	2,500		5,800	150	85,000	3,250
Alpine						15
Amador	462	15	258	51	1,410	250
Butte	9,300	4,800	50,000	200,000	240,000	62,000
Calaveras	300	100	4,000	3,000	4,000	1,000
Colusa	1,000		4,000		5,000	
Contra Costa	2,000	850	8,500	200	52,300	6,500
Del Norte						
El Dorado	2,500	22	4,700	53	121,000	14,503
Fresno	158,590	1,520	48,950	2,160	3,728,110	
Glenn	7,000	9,000	4,500	7,860	10,620	9,750
Humboldt					3,500	750
Imperial	6,060	2,019	3,676	1,838	1,342	1,507
Inyo	15	5			28,000	700
Kern	1,500	3,800	5,000	42,000	52,000	46,000
Kings					502,400	15,700
Lake	529	95	3,825	12	12,747	3,769
Lassen					3,500	1,806
Los Angeles	15,691	28,282	65,986	31,803	68,927	68,259
Madera	728	2,473	1,738	15,437	59,567	23,377
Marin						
Mariposa	500		5,000		800	200
Mendocino					37	145
Merced	25,000	52,500	10,290	14,490	450,000	75,000
Modoc					1,870	1,350
Mono						
Monterey	700	500	2,500	1,200	8,000	3,500
Napa	20,030	3,346	7,880	2,505	137,782	41,770
Nevada	325		120		15,300	600
Orange	2,000		13,000		4,000	1,200
Placer	4,990	50	26,400	280	1,100,150	141,250
Plumas					130	375
Riverside	2,610	2,990	108,480	38,660	218,780	128,500
Sacramento	4,000	500	25,000	3,000	45,000	7,500
San Benito					21,500	
San Bernardino			42,900	58,680	670,300	271,200
San Diego	870		31,600	6,400	5,960	1,890
San Francisco						
San Joaquin	2,519	80	13,402	2,119	124,499	12,308
San Luis Obispo	1,800	1,600	2,000	1,700	50,000	25,000
San Mateo	150		8,350		1,500	
Santa Barbara			37,180	2,940	9,920	3,780
Santa Clara	2,700	1,500	15,000	5,000	530,000	20,000
Santa Cruz	209	85	311	240	8,600	5,140
Shasta	800		12,500	15,000	50,000	3,500
Sierra					356	35
Siskiyou					940	
Solano	6,000		3,000		500,000	
Sonoma	2,810	270	41,710	10,120	31,290	21,210
Stanislaus	18,000	3,850	7,600	5,000	376,100	51,900
Sutter	924	9,000	1,374		184,265	
Tehama	14,175		74,720		920,197	
Trinity	50	60			1,800	1,100
Tulare	85,140		84,840		418,690	
Tuolumne	472	48	41	30	5,500	2,000
Ventura	365		7,808	200	3,160	
Yolo	11,500		21,000		117,300	
Yuba	91,000	2,300	20,000	40,000	130,000	2,550
Totals	507,814	131,669	834,939	515,221	11,123,149	1,082,149

SCHEDULE I—Continued.

Number of Fruit Trees Growing in Spring of 1916.

County	Pear		Plum		Prune	
	Bearing	Nonbearing	Bearing	Nonbearing	Bearing	Nonbearing
Alameda	53,500	600	1,600	1,100	178,600	12,000
Alpine	62	------	124	------	31	------
Amador	5,430	50	1,500	------	2,412	50
Butte	30,000	20,000	8,000	3,500	160,000	160,000
Calaveras	500	100	2,000	100	500	200
Colusa	1,000	------	300	------	180,000	15,000
Contra Costa	81,300	8,640	3,800	350	76,800	4,500
Del Norte	------	------	------	------	------	------
El Dorado	105,000	29,391	10,000	1,470	141,400	------
Fresno	------	------	13,550	3,000	80,270	------
Glenn	6,000	15,000	2,460	2,260	22,962	19,110
Humboldt	1,500	5,000	------	------	16,000	250
Imperial	2,228	6,841	------	------	310	620
Inyo	14,500	3,150	1,900	------	1,910	------
Kern	15,300	99,700	7,000	10,400	46,000	33,500
Kings	------	------	------	------	30,700	1,500
Lake	129,706	69,676	------	------	62,772	26,926
Lassen	636	456	1,096	370	1,180	214
Los Angeles	16,268	83,535	511	660	10,654	21,931
Madera	493	535	------	------	20	800
Marin	------	------	------	------	------	------
Mariposa	500	10	200	------	300	------
Mendocino	275	725	35	------	335	275
Merced	7,500	3,300	3,500	7,500	2,000	2,913
Modoc	940	800	1,085	265	500	125
Mono	------	------	------	------	------	------
Monterey	4,000	2,200	4,600	1,400	4,500	1,500
Napa	89,160	23,410	94,610	41,320	259,330	489,900
Nevada	74,000	23,500	4,850	1,800	7,800	1,600
Orange	1,500	2,200	2,000	------	------	------
Placer	140,200	22,500	350,200	20,200	10,500	2,000
Plumas	558	618	370	464	------	------
Riverside	37,920	75,840	1,455	1,545	59,040	14,760
Sacramento	135,000	10,000	15,000	2,000	115,000	5,000
San Benito	7,000	2,500	------	------	225,000	100,000
San Bernardino	5,500	37,900	------	------	------	------
San Diego	1,890	------	------	------	3,140	------
San Francisco	------	------	------	------	------	------
San Joaquin	13,690	7,392	24,460	3,980	40,820	3,206
San Luis Obispo	180,000	25,000	5,000	3,300	90,000	35,000
San Mateo	2,400	------	1,250	------	3,800	------
Santa Barbara	1,480	------	------	------	1,140	------
Santa Clara	153,000	22,300	298,700	15,300	5,595,000	425,000
Santa Cruz	12,700	8,453	------	------	71,200	5,342
Shasta	20,000	------	1,000	------	105,000	12,000
Sierra	441	18	450	12	------	------
Siskiyou	------	------	1,120	------	------	------
Solano	325,000	------	130,000	------	550,000	------
Sonoma	74,840	1,870	6,230	330	387,292	532,529
Stanislaus	14,200	4,000	4,600	1,300	16,400	2,800
Sutter	10,962	------	3,699	------	57,295	------
Tehama	78,812	------	4,000	------	120,750	------
Trinity	1,100	600	600	350	200	400
Tulare	2,800	------	32,360	------	880	------
Tuolumne	1,250	500	1,600	300	700	200
Ventura	130	------	215	------	2,683	------
Yolo	45,500	------	29,600	------	83,200	------
Yuba	120,100	81,000	90,000	53,000	60,000	51,260
Totals	2,027,751	699,310	1,166,630	177,556	8,880,335	1,982,411

SCHEDULE I—Continued.

Number of Fruit Trees Growing in Spring of 1916.

County	Lemon		Lime		Orange	
	Bearing	Nonbearing	Bearing	Nonbearing	Bearing	Nonbearing
Alameda	1,300		16		3,500	
Alpine						
Amador	20	4			376	60
Butte	600	700			200,000	24,000
Calaveras	50	50			300	200
Colusa	1,500	45,000			15,000	20,000
Contra Costa	500	250			3,700	600
Del Norte						
El Dorado					180	1
Fresno	25,340	8,520			133,640	3,040
Glenn	5,000	30,000	25	40	15,000	100,000
Humboldt						
Imperial	1,305	2,001			3,074	6,208
Inyo						
Kern	500	86,000			40,500	95,000
Kings						
Lake					75	
Lassen						
Los Angeles	121,137	178,036			767,262	298,394
Madera						10
Marin						
Mariposa	100		10		1,000	100
Mendocino						
Merced	1,600	1,000			4,500	4,000
Modoc						
Mono						
Monterey	100	150			100	75
Napa	3,500	3,600			6,750	4,800
Nevada	15				160	60
Orange	212,300	17,850			815,000	575,000
Placer	465				30,000	1,000
Plumas						
Riverside	206,080	190,240			1,635,900	311,600
Sacramento	3,000	200			90,000	14,000
San Benito						
San Bernardino	234,180	210,150			3,005,100	694,530
San Diego	100,560	21,630			58,180	3,670
San Francisco						
San Joaquin	220	52			2,859	1,590
San Luis Obispo	4,000	3,500			6,000	4,000
San Mateo	150				220	
Santa Barbara	142,240	15,800			750	
Santa Clara	3,100	12,000	400	150	2,000	1,200
Santa Cruz	605	311			171	
Shasta	250				800	
Sierra						
Siskiyou						
Solano	3,000		300		8,500	
Sonoma	540	15			9,260	380
Stanislaus	1,000				11,700	
Sutter	74				265	
Tehama		500			23,520	
Trinity						
Tulare	180,090		55		1,104,160	
Tuolumne	10	6			100	25
Ventura	303,540	192,164	25		201,063	61,030
Yolo	1,000				1,450	
Yuba					5,000	3,000
Totals	1,558,971	1,019,729	831	190	8,237,115	2,227,573

SCHEDULE I—Concluded.

Number of Fruit Trees Growing in Spring of 1916.

County	Pomelo		Almond		Walnut	
	Bearing	Nonbearing	Bearing	Nonbearing	Bearing	Nonbearing
Alameda	18		93,000	8,000	6,000	2,800
Alpine						4
Amador	25		3,012	650	144	79
Butte			14,000	30,000	1,000	2,000
Calaveras			1,200	300	1,500	500
Colusa	1,000	1,000	25,000	300,000	6,000	
Contra Costa			182,000	15,300	33,600	18,600
Del Norte						
El Dorado			2,000	2,197	13,500	160
Fresno			8,320			
Glenn	200	1,000	15,000	120,000	3,500	500
Humboldt					70	6,000
Imperial	2,480	70,583	607	430		
Inyo			11	4	25	35
Kern	2,000		4,000	6,850	500	4,400
Kings						
Lake			25,362	22,635	1,077	13,695
Lassen			20		100	
Los Angeles	985	1.980	7,610	14,773	107,802	62,890
Madera			300	300	10	580
Marin						
Mariposa			100		100	10
Mendocino			25	19	10	
Merced	450	200	42,500	90,000	1,500	3,419
Modoc						
Mono						
Monterey			1,000	1,500	1,500	1,500
Napa	200	120	67,400	21,420	24,870	21,040
Nevada			280	30	1,960	1,900
Orange					330,000	421,000
Placer	150	300	3,760	2,000	285	250
Plumas						
Riverside	17,670	14,787	98,350	42,150	20,020	80,080
Sacramento	200	50	120,000	11,000	6,000	1,500
San Benito			4,000		1,000	
San Bernardino	33,120	55,800			19,500	42 210
San Diego	800		1,700		2,050	960
San Francisco						
San Joaquin			106,202	25,301	1,598	4,461
San Luis Obispo	600	500	245,000	40,000	50,000	30,000
San Mateo			750		3,200	
Santa Barbara					60,700	12,800
Santa Clara	450	325	25,800	8,000	17,315	7,000
Santa Cruz			160		946	480
Shasta			3,000		500	
Sierra					45	10
Siskiyou						
Solano			125,000		8,000	
Sonoma			7,610	850	5,220	1,680
Stanislaus			18,000	40,400	11,000	6,000
Sutter			86,289		744	
Tehama			48,725		4,000	
Trinity					200	1,600
Tulare	36,000		15,000		21,600	
Tuolumne			161	60	600	300
Ventura	2,454		26,240		164,564	35,838
Yolo			53,800		2,100	
Yuba			12,100	2,400	3,000	1,500
Totals	98,892	146,645	1,494,334	806,569	941,955	787,781

SCHEDULE J.

Acres of Grapevines Growing in Spring of 1916.

County	Table grapes, acres		Raisin grapes, acres		Wine grapes, acres	
	Bearing	Nonbearing	Bearing	Nonbearing	Bearing	Nonbearing
Alameda	1,150				1,400	
Alpine						
Amador	35				75	
Butte	35		50		60	
Calaveras	50	50	10	10	1,500	500
Colusa	1,200		3,000	800	500	
Contra Costa	1,875	1,160	45		5,125	340
Del Norte						
El Dorado	70				250	
Fresno	8,000	200	75,320	4,770	21,620	1,120
Glenn	150	68				
Humboldt						
Imperial	1,200					
Inyo	250	200				
Kern	300	40	625	90	60	
Kings			13,450	197	200	
Lake	90				400	
Lassen	10	30				
Los Angeles	6,156		40		674	
Madera	16		2,388		1,809	
Marin						
Mariposa	80	10	100	40	20	
Mendocino					2,464	275
Merced	975	500	875	150	3,000	400
Modoc						
Mono						
Monterey	3,100	1,600			2,500	1,400
Napa					23,640	7,010
Nevada	225				705	
Orange	40				60	
Placer	3,620	1,000			2,175	
Plumas						
Riverside	2,348	100				
Sacramento	9,200	200	150		18,000	1,450
San Benito	100	10			400	
San Bernardino	4,280				14,238	
San Diego	715		2,630		780	
San Francisco						
San Joaquin	7,360	76			9,785	135
San Luis Obispo	30				240	
San Mateo						
Santa Barbara					220	
Santa Clara	825	425			5,930	3,200
Santa Cruz	276	34			1,100	58
Shasta	150		275		650	
Sierra						
Siskiyou						
Solano	840				3,800	160
Sonoma	390	3			16,310	60
Stanislaus	1,769	128	367	65	2,301	
Sutter	88		2,905	848	235	
Tehama	200	103	425	425	1,150	
Trinity						
Tulare	2,125		15,320		830	
Tuolumne	200	375			675	1,000
Ventura						
Yolo	730		1,300		500	
Yuba	225	150	300	160	300	150
Totals	59,478	6,462	119,575	7,555	145,681	17,258

SCHEDULE K.

Number of Acres Sown for Crop of 1916.

County	Wheat	Oats	Barley	Corn	Hay	Rye	Hops
Alameda	22,000	2,100	33,000	700	82,000	------------	800
Alpine	300	75	10	1	1,400	------------	------------
Amador	3,860	2,145	4,450	320	------------	------------	------------
Butte	16,200	3,060	15,700	250	16,500	------------	800
Calaveras	1,000	500	2,000	50	4,000	------------	------------
Colusa	40,000	1,000	180,000	1,500	10,000	------------	------------
Contra Costa	15,000	19,600	60,000	950	------------	------------	------------
Del Norte	65	2,500	300	1,260	------------	------------	------------
El Dorado	400	3,600	500	------------	3,250	------------	------------
Fresno	32,760	1,280	31,730	800	35,610	------------	------------
Glenn	3,500	600	52,475	800	12,000	------------	------------
Humboldt	------------	6,500	1,800	200	7,500	------------	------------
Imperial	1,883	------------	83,540	52,207	------------	------------	------------
Inyo	8,750	2,560	1,700	8,240	6,000	------------	------------
Kern	55,000	5,000	35,000	------------	------------	------------	------------
Kings	10,000	------------	11,000	------------	------------	------------	------------
Lake	1,500	1,500	1,500	750	5,000	------------	120
Lassen	17,000	2,000	4,000	50	2,000	2,000	------------
Los Angeles	2,588	2,821	5,171	229	3,927	------------	------------
Madera	23,791	5,632	65,416	------------	------------	------------	------------
Marin	------------	------------	------------	------------	4,000	------------	------------
Mariposa	1,000	200	1,500	200	12,000	100	------------
Mendocino	10,500	8,000	6,000	500	35,000	100	2,800
Merced	7,000	13,200	82,000	11,400	12,000	9,600	------------
Modoc	16,404	1,363	7,652	------------	59,262	------------	------------
Mono	30	10	------------	------------	4,000	------------	------------
Monterey	7,000	7,000	115,000	300	75,000	100	------------
Napa	4,000	7,500	6,000	3,500	40,000	------------	------------
Nevada	------------	------------	------------	------------	6,400	------------	------------
Orange	1,200	------------	25,000	------------	5,000	------------	------------
Placer	18,270	7,500	9,500	45	25,000	------------	100
Plumas	2,000	8,600	1,400	------------	3,200	------------	------------
Riverside	28,500	2,370	41,320	1,180	5,250	------------	------------
Sacramento	35,000	31,000	43,000	1,200	85,000	25	3,000
San Benito	4,000	1,500	23,000	------------	10,000	------------	------------
San Bernardino	------------	440	13,060	10,000	12,893	------------	------------
San Diego	13,880	8,250	22,540	2,240	24,900	------------	------------
San Francisco	------------	------------	------------	------------	------------	------------	------------
San Joaquin	60,000	20,000	140,000	2,000	------------	6,000	200
San Luis Obispo	70,000	2,500	25,000	1,500	65,000	100	------------
San Mateo	1,450	38,500	4,000	150	27,000	------------	------------
Santa Barbara	10,500	6,500	40,500	100	49,000	------------	------------
Santa Clara	6,250	1,425	13,000	300	42,600	------------	------------
Santa Cruz	------------	------------	------------	------------	2,340	------------	------------
Shasta	7,000	3,000	2,500	750	12,000	------------	200
Sierra	600	700	2,000	------------	3,000	500	------------
Siskiyou	21,480	4,300	------------	------------	25,720	------------	------------
Solano	140,000	20,000	200,000	500	150,000	------------	------------
Sonoma	2,400	3,500	2,000	1,240	58,860	------------	3,100
Stanislaus	20,000	35,000	110,000	2,387	1,325	365	------------
Sutter	9,014	2,299	15,872	------------	4,704	------------	------------
Tehama	58,780	4,750	50,175	400	43,850	75	625
Trinity	2,300	800	150	70	5,000	------------	------------
Tulare	18,000	4,500	32,000	1,800	3,200	------------	------------
Tuolumne	1,000	1,500	900	------------	250	------------	------------
Ventura	------------	------------	------------	------------	------------	------------	------------
Yolo	8,045	450	97,500	200	13,500	------------	1,600
Yuba	29,000	9,000	75,000	320	9,500	------------	610
Totals	870,183	321,070	1,796,861	110,589	1,124,941	18,965	13,985

SCHEDULE K—Continued.

Number of Acres Sown for Crop of 1916.

County	Potatoes	Celery	Onions	Beans	Asparagus	Tomatoes	Strawberries
Alameda	7,000	100	300	300	350	450	375
Alpine	8	----------	----------	----------	----------	----------	----------
Amador	100	----------	----------	----------	----------	----------	----------
Butte	----------	----------	----------	----------	----------	----------	----------
Calaveras	100	----------	10	10	----------	5	5
Colusa	500	----------	----------	2,500	----------	----------	----------
Contra Costa	7,700	960	1,500	3,000	4,500	----------	----------
Del Norte	----------	----------	----------	----------	----------	----------	----------
El Dorado	100	----------	----------	----------	----------	----------	----------
Fresno	----------	----------	----------	----------	----------	----------	560
Glenn	----------	----------	15	60	----------	----------	----------
Humboldt	500	----------	----------	----------	----------	----------	----------
Imperial	125	----------	----------	300	536	310	----------
Inyo	1,500	----------	10	150	----------	10	10
Kern	500	----------	----------	400	----------	----------	----------
Kings	----------	----------	----------	----------	----------	----------	----------
Lake	100	----------	----------	----------	----------	----------	----------
Lassen	600	----------	----------	----------	----------	----------	----------
Los Angeles	----------	----------	----------	4,086	----------	----------	613
Madera	----------	----------	----------	----------	----------	----------	----------
Marin	350	----------	----------	----------	----------	----------	----------
Mariposa	400	10	10	100	2	10	5
Mendocino	600	----------	10	50	1	50	25
Merced	3,700	----------	50	2,100	----------	200	10
Modoc	6,006	----------	----------	----------	----------	----------	----------
Mono	10	----------	----------	----------	----------	----------	----------
Monterey	560	----------	10	3,000	----------	----------	150
Napa	2,000	----------	----------	----------	----------	----------	----------
Nevada	275	----------	----------	----------	----------	----------	----------
Orange	1,500	1,200	----------	43,500	----------	----------	----------
Placer	15	----------	----------	15	50	100	1,100
Plumas	----------	----------	----------	----------	----------	----------	----------
Riverside	856	----------	----------	1,100	----------	----------	----------
Sacramento	----------	----------	----------	35,000	----------	----------	1,200
San Benito	----------	----------	----------	----------	----------	----------	150
San Bernardino	----------	----------	----------	550	----------	----------	----------
San Diego	----------	----------	----------	2,180	----------	----------	----------
San Francisco	----------	----------	----------	----------	----------	----------	----------
San Joaquin	25,000	500	2,500	30,000	1,000	300	250
San Luis Obispo	850	----------	20	22,000	----------	----------	15
San Mateo	625	----------	----------	1,250	----------	----------	----------
Santa Barbara	1,540	----------	----------	16,500	----------	----------	----------
Santa Clara	925	98	200	600	----------	500	500
Santa Cruz	----------	----------	----------	----------	----------	----------	----------
Shasta	150	----------	----------	300	----------	----------	----------
Sierra	350	----------	----------	----------	----------	----------	----------
Siskiyou	1,135	----------	----------	----------	----------	----------	----------
Solano	----------	----------	----------	900	100	200	----------
Sonoma	1,080	----------	----------	----------	----------	260	320
Stanislaus	----------	----------	----------	15,000	----------	----------	----------
Sutter	----------	----------	----------	----------	20	----------	----------
Tehama	----------	----------	----------	300	----------	----------	----------
Trinity	200	----------	----------	40	----------	----------	----------
Tulare	940	----------	----------	730	----------	----------	----------
Tuolumne	----------	----------	----------	----------	----------	----------	----------
Ventura	----------	----------	----------	67,800	----------	----------	----------
Yolo	----------	----------	----------	575	----------	----------	----------
Yuba	120	----------	20	1,645	----------	40	25
---	67,760	2,868	4,655	256,041	6,559	2,435	5,313

SCHEDULE K—Concluded.

Number of Acres Sown for Crop of 1916.

County	Other berries	Canta-loupes	Other melons	Sugar beets	Standing alfalfa	Rice
Alameda	50	5	5	600	600	
Alpine					500	
Amador					1,130	
Butte					8,000	19,000
Calaveras	5	4	4		150	
Colusa					10,000	30,000
Contra Costa					1,800	
Del Norte						
El Dorado						
Fresno	340				65,720	100
Glenn					17,500	16,000
Humboldt					700	
Imperial*		13,043			95,562	
Inyo	30		1	40	32,000	
Kern				1,500	95,000	
Kings					35,133	
Lake					4,000	
Lassen					16,400	
Los Angeles				2,806	3,307	
Madera					17,000	
Marin					10	
Mariposa	25	25	20		150	
Mendocino	50	10	60		4,200	
Merced	20	125	25		74,200	30
Modoc					17,818	
Mono					3,000	
Monterey	150			25,000	10,000	
Napa					3,800	
Nevada					120	
Orange				30,000	2,700	
Placer	1,500	10	5	50	1,560	
Plumas					4,300	
Riverside†				750	25,384	
Sacramento	100				5,500	
San Benito					2,230	
San Bernardino				6,920	10,780	
San Diego				970	2,140	
San Francisco						
San Joaquin	100	50	300	10,000	8,000	
San Luis Obispo	15			10,000	3,500	
San Mateo						
Santa Barbara				7,500		
Santa Clara	500				4,300	
Santa Cruz					274	
Shasta					20,000	
Sierra					500	
Siskiyou						
Solano				200	40,000	280
Sonoma	800				380	
Stanislaus	25	3,000	1,000	60	77,916	300
Sutter					5,023	
Tehama					8,100	
Trinity					5,000	
Tulare				6,000	97,337	1,500
Tuolumne					50	
Ventura				300		
Yolo				13,300	16,500	13,500
Yuba	25				3,260	1,080
Totals	3,735	16,272	1,420	115,996	862,534	81,790

*Imperial also reports 44,116 acres of cotton.
†Riverside also reports 1,700 acres of cotton.

SCHEDULE L.

Assessment of Railroads by the State Board of Equalization.

	1915			1916		
	Mileage in California	Per mile	Total assessment	Mileage in California	Per mile	Total assessment
Central Pacific Railway	1,181.895	$20,648 55	$24,404,420	1,211.85	$21,000 00	$25,448,850
Southern Pacific Railroad	2,537.161	26,372 96	66,912,526	2,536.569	26,400 00	66,965,422
South Pacific Coast Railway	85.591	27,159 98	2,324,650	855.91	27,200 00	2,328,075
Northwestern Pacific Railroad	484.95	13,614 60	6,602,400	484.61	13,650 00	6,614,926
Atchison, Topeka and Santa Fe Railway	1,370.42	23,291 15	31,918,650	1,377.34	23,200 00	31,954,288
San Pedro, Los Angeles and Salt Lake Railroad	227.93	24,023 92	5,475,772	231.94	24,100 00	5,589,754
Sierra Railway of California	75.95	9,786 57	743,290	75.95	9,750 00	740,512
Western Pacific Railway	387.989	20,000 00	7,759,780	387.989	20,000 00	7,759,780
Boca and Loyalton Railroad	42.03	3,233 80	135,915	42.35	2,000 00	84,700
Nevada-California-Oregon Railway	196.92	3,372 50	664,113	231.56	3,400 00	787,304
Sierra and Mohawk Railway	36.78	1,000 00	36,780	----------	----------	----------
Oakland, Antioch and Eastern Railway	98.84	7,500 00	741,300	110.54	7,500 00	829,050
Northern Electric Railway	150.17	7,297 57	1,095,876	151.06	7,300 00	1,102,738
Central California Traction	54.90	8,101 82	444,790	54.90	8,100 00	444,690
Pacific Coast Railway	99.58	3,708 22	369,264	99.58	3,700 00	368,446
San Francisco, Napa and Calistoga Railway	41.659	8,528 17	355,275	41.596	8,600 00	357,726
Nevada County Narrow Gauge Railroad	20.412	8,764 45	178,900	20.412	8,800 00	179,626
Lake Tahoe Railway	16.30	4,281 70	69,793	16.30	4,300 00	70,090
Yosemite Valley Railroad	78.429	6,733 15	528,074	78.429	7,200 00	564,689
Pajaro Valley Consolidated Railroad	41.36	3,902 66	161,414	41.36	4,000 00	165,440
Ocean Shore Railroad	39.22	3,366 40	132,030	39.22	3,400 00	133,348
California Central Railroad	7.20	4,200 90	30,246	7.947	4,000 00	31,788
Tidewater Southern Railway	32.233	5,000 00	161,165	32.233	5,000 00	161,165
Tonopah and Tidewater Railroad	144.60	4,198 62	607,120	144.60	4,200 00	607,320
Riverside, Rialto and Pacific Railway	9.78	5,000 00	48,900	9.78	5,000 00	48,900
Trona Railway	29.985	4,000 00	119,940	29.985	4,000 00	119,940
Total railroads	7,492.287	----------	$152,022,383	8,314.010	----------	$152,458,567
The Pullman Company	4,439.839	$656 16	2,913,253	4,435.029	800 00	3,548,023
Grand totals	11,932.126	----------	$154,935,636	12,749,039	----------	$157,006,590

NOTE.—No state taxes collected on these assesssments.

SCHEDULE M.

RAILROAD COMPANIES.

State Taxes Levied Against Railroads, Including Street Railways, for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
Amador Central Railroad Company	$87,007 98	$4,567 92	$87,542 76	$4,596 00
Angels Flight Railway Company	12,451 76	653 72	15,934 90	836 58
Arcata and Mad River Railroad Company	96,903 61	5,087 44	89,327 10	4,689 68
Atchison, Topeka and Santa Fe Railway Company, The	18,196,324 46	955,307 04	19,340,859 96	1,015,395 14
Bakersfield and Kern Electric Railway Company	95,060 18	4,990 66	47,603 20	2,499 16
Bay Point and Clayton Railroad Company	29,622 02	1,555 16	31,644 39	1,661 34
Boca and Loyalton Railroad Company	62,854 29	3,299 86	31,977 57	1,678 82
Bucksport and Elk River Railroad Company	21,599 62	1,133 98	8,696 36	456 56
Butte County Railroad Company	117,935 61	6,191 62	--------	--------
California Central Railroad Company	5,148 49	270 30	--------	--------
California Street Cable Railroad Company	433,200 25	22,743 02	448,124 10	23,726 52
California Western Railroad and Navigation Company	250,895 92	13,172 04	242,562 39	12,734 52
Camino, Placerville and Lake Tahoe Railroad Company	32,726 63	1,718 14	9,205 98	483 32
Cement, Tolenas and Tidewater Railroad Company	56,217 56	2,951 42	61,400 98	3,223 56
Central California Traction Company	339,957 73	17,847 78	279,271 99	14,661 78
Chowchilla Pacific Railway Company	--------	--------	2,429 42	127 54
Colusa and Lake Railroad Company	15,422 00	809 66	1,882 00	98 80
Court Flight Incline Railroad Company	1,854 00	97 34	1,685 45	88 48
Death Valley Railroad Company	3,020 43	158 58	100,758 25	5,289 80
Diamond and Caldor Railway	71,059 39	3,730 62	64,153 43	3,368 06
Fairfax Incline Railroad Company	696 80	36 58	699 25	36 70
Fresno Traction Company	237,204 26	12,453 22	227,816 85	11,960 38
Glendale and Montrose Railway Company	17,468 93	917 12	22,288 97	1,170 18
Holton Interurban Railway Company	83,542 60	4,384 94	63,946 69	3,357 20
Humboldt Northern Railway Company	35,235 18	1,849 84	25,548 31	1,341 28
Humboldt Transit Company	90,472 82	4,749 82	77,994 37	4,094 70
Iron Mountain Railway Company, The	36,402 83	1,911 14	49,249 62	2,585 60
Lake Tahoe Railway and Transportation Company	40,680 09	2,135 70	39,456 10	2,071 44
Los Angeles and Mt. Washington Railway Company	2,176 00	114 24	2,243 30	117 78
Los Angeles and San Diego Beach Railway Company	67,038 05	3,519 50	77,818 98	4,085 50
Los Angeles Railway Corporation	6,725,207 46	353,073 40	6,081,385 79	319,272 76
McCloud River Railroad Company	322,712 39	16,942 40	294,726 19	15,473 12
Mexico and San Diego Railway Company	635 05	33 34	871 55	45 76
Modesto and Empire Traction Company	10,041 01	527 16	9,359 21	491 36
Montecito Railroad Company	--------	--------	394 50	20 72

SCHEDULE M—Concluded.

RAILROAD COMPANIES—Continued.

State Taxes Levied Against Railroads, Including Street Railways, for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
Monterey and Del Monte Heights Railway Company	$400 00	$21 00	----------	----------
Monterey and Pacific Grove Railway Company	35,976 35	1,888 76	$32,785 20	$1,721 22
Mt. Tamalpais and Muir Woods Railway	56,201 95	2,950 60	178,344 36	9,363 08
Nevada-California-Oregon Railway	321,192 34	16,862 60	331,177 33	17,386 80
Nevada County Narrow Gauge Railroad Company	131,696 30	6,914 06	140,363 28	7,369 08
Nevada County Traction Company	28,410 50	1,491 54	27,167 50	1,426 30
Northern Electric Railway Company	817,905 32	42,940 02	791,096 75	41,532 58
Northwestern Pacific Railroad Company	3,733,204 53	195,993 24	3,982,513 38	209,081 96
Oakland, Antioch and Eastern Railway	476,336 73	25,007 68	601,118 08	31,558 70
Ocean Shore Railroad Company	284,733 29	14,948 50	231,246 42	12,140 44
Pacific Coast Railway Company	211,210 32	11,088 54	202,971 80	10,656 02
Pacific Electric Railway Company	8,803,109 35	462,163 24	8,786,866 62	461,310 50
Pacific Gas and Electric Company	556,908 00	29,237 66	425,337 97	22,330 24
Pajaro Valley Consolidated Railroad Company	79,019 04	4,148 50	98,625 49	5,177 84
Peninsular Railway Company	301,066 94	15,806 02	286,347 19	15,033 22
Petaluma and Santa Rosa Railway Company	174,912 68	9,182 92	162,042 18	8,507 22
Point Loma Railroad Company	45,434 17	2,385 30	39,969 73	2,098 40
Quincy Western Railroad Company	15,510 73	814 32	14,944 31	784 58
Riverside, Rialto and Pacific Railroad Company	92,831 29	4,873 64	68,394 85	3,590 72
Sacramento Valley and Eastern Railway Company	8,688 29	456 14	12,715 73	667 58
Sacramento Valley Electric Railroad Company	834 02	43 78	----------	----------
San Diego and Arizona Railway Company	26,009 53	1,365 50	28,238 04	1,482 50
San Diego and Southeastern Railway Company	361,745 52	18,991 64	277,425 57	14,564 84
San Diego Electric Railway Company	980,308 29	51,466 18	1,038,795 80	54,536 78
San Francisco, Napa and Calistoga Railway	222,769 19	11,695 38	226,883 95	11,911 40
San Francisco-Oakland Terminal Railways	4,612,364 78	242,149 14	4,616,625 85	242,372 86
San Joaquin and Eastern Railroad Company	47,480 65	2,492 74	38,381 98	2,015 06
San Jose Railroads	352,381 09	18,500 00	336,473 57	17,664 86
San Pedro, Los Angeles and Salt Lake Railroad Company	3,730,798 00	195,866 90	3,622,385 00	190,175 22
Santa Barbara and Suburban Railway Company	71,996 52	3,779 82	78,009 85	4,095 52
Santa Maria Valley Railroad Company	69,385 82	3,642 76	91,803 50	4,819 68
Shasta Springs Scenic Railway	460 25	24 16	376 65	19 78
Sierra and Mohawk Railway	19,396 37	1,018 30	----------	----------
Sierra Railway Company of California	380,809 50	19,992 50	324,214 04	17,021 24
Southern Pacific Company	58,059,423 08	3,048,119 70	63,116,823 53	3,313,633 24
South San Francisco Belt Railway	16,630 70	873 12	15,639 50	821 08

South San Francisco Railroad and Power Company	22,389 55	1,175 46	23,016 45	1,208 36
Stockton Electric Railroad Company	207,836 99	10,911 44	204,426 61	10,732 40
Stockton Terminal and Eastern Railroad Company	23,256 83	1,220 98	19,730 02	1,035 82
Sugar Pine Railway Company	82,836 31	4,348 90	52,599 54	2,761 48
Sunset Railway Company	383,318 94	20,124 24	298,159 54	15,653 38
Tidewater Southern Railway Company	95,238 50	5,000 02	83,387 84	4,377 86
Tonopah and Tidewater Railroad Company	315,913 29	16,585 44	344,715 79	18,097 58
Trona Railway Company	6,716 98	352 64	35,469 52	1,862 14
Union Traction Company	73,546 87	3,861 22	60,894 89	3,196 98
United Railroads of San Francisco	8,379,786 76	439,938 80	7,998,842 78	419,939 24
Ventura County Railway Company	30,438 00	1,598 00	28,407 17	1,491 38
Visalia Electric Railroad Company	102,732 96	5,393 48	85,864 05	4,507 86
Western Pacific Railway Company	2,602,908 36	136,652 68	2,943,127 23	154,514 18
Yosemite Valley Railroad Company	281,080 19	14,756 70	442,141 55	23,212 44
Yreka Railroad Company	24,312 95	1,276 42	21,136 40	1,109 66
Totals	$125,358,630 31	$6,581,327 02	$130,706,884 29	$6,862,111 44

SCHEDULE N.

GAS AND ELECTRIC COMPANIES.

State Taxes Levied Against Gas and Electric Companies for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
Alaska Commercial Building	$4,723 86	$248 00	$1,461 10	$234 20
Alpine Evaporated Cream Company	1,972 66	103 56	2,095 00	109 98
Alta District Gas Company	6,935 15	364 10	6,908 00	362 66
Alturas Electric Power Company	13,608 66	714 46	14,614 31	767 26
Amador Electric Light and Power Company	34,139 85	1,792 34	35,274 55	1,851 92
Angels Electric Light and Power Company	22,779 74	1,195 94	16,953 27	890 04
Banning Gas and Lighting Company, The	7,402 26	388 62	6,078 05	319 10
Barstow Utility Company	1,575 60	82 72	1,893 85	99 42
Bay Point Light and Water Company	6,547 18	343 72	5,260 57	276 18
Beaumont Gas and Power Company	4,618 72	242 48	3,701 02	194 30
Beverly Hills Utilities Company	----	----	14,468 65	759 60
Birch Oil Company	12,070 26	633 68	8,402 94	441 16
Bishop Light and Power Company	----	----	13,417 79	704 44
Boulder Creek Electric Light and Water Company	1,506 80	79 10	2,232 07	117 18
Brookdale Land Company	1,620 00	85 04	1,470 00	77 18
Butte County Power, Light and Water Company	2,017 20	105 90	1,572 35	82 54
California Natural Gas Company	315,121 12	16,543 86	236,707 39	12,427 14
California-Oregon Power Company	127,897 51	6,714 62	141,267 57	7,416 54
California Power and Manufacturing Company	847 45	44 50	1,750 79	91 92
California Telephone and Light Company	69,819 47	3,665 52	72,687 41	3,816 08
Calistoga Electric Company	5,861 11	307 70	9,202 71	483 14
Central California Gas Company	80,782 02	4,241 06	84,900 61	4,457 28
Central Natural Gas Company	6,270 45	329 20	5,935 28	311 60
Central Oakland Light and Power Company	120,440 31	6,323 12	----	----
Citrus Belt Gas Company	110,080 44	5,779 22	114,030 52	5,986 60
C. J. York	1,759 75	92 38	1,943 70	102 04
Coachella Valley Ice and Electric Company	35,086 88	1,842 06	7,058 47	370 56
Coalinga Gas and Power Company	15,545 80	816 16	12,364 91	649 16
Coalinga Pipe Line Company	1,772 75	93 06	2,192 73	115 12
Coast Counties Gas and Electric Company	345,483 20	18,137 86	335,212 0	17,598 66
Coast Valleys Gas and Electric Company	223,658 75	11,742 08	202,956 87	10,655 24
Consolidated Securities Company	494 60	25 96	----	----
Consumers' Light and Power Company	164,038 14	8,612 00	----	----
Contra Costa Gas Company	----	----	12,689 70	666 20
Corona Gas and Electric Light Company	23,809 63	1,250 00	24,370 44	1,279 44
Crescent City Light, Water and Power Company	2,686 55	141 04	----	----
Del Mar Water, Light and Power Company	3,269 22	171 64	4,432 92	232 72
Downey Light, Power and Water Company	4,572 90	240 08	----	----

Economic Gas Company	197,129 48	10,349 30	179,677 85	9,433 08
E. M. Wilson, L. A. Wilson and Nettie B. Harris	160 00	8 40		
Equitable Light and Power Company	120,136 33	6,307 16		
Escondido Utilities Company	16,672 29	875 30	16,353 01	858 51
Estate of F. H. Bell	12,734 90	668 58	24,226 80	1,271 90
Excelsior Gold Mines Company	749 45	39 34	1,274 96	66 94
Forest Hill Electric Company	1,912 85	100 42	1,813 30	95 20
Fort Bragg Electric Company	30,660 22	1,609 66	27,810 70	1,460 06
Fowler Gas Company	2,061 62	108 24	3,523 15	184 96
Geo. M. Keller	2,988 95	156 92	3,423 09	179 72
Great Western Power Company	2,680,185 41	140,709 74	3,225,466 26	169,336 98
Great Western Power Company of California			100 00	5 24
Grizzly Electric Company	53 90	2 82	3,546 59	186 20
Half Moon Bay Light and Power Company	20,650 16	1,084 14	15,708 89	824 72
Hanford Gas and Power Company	25,623 34	1,345 22	24,742 11	1,298 96
Hemet Milling and Power Company	3,289 80	172 72	3,423 58	179 74
Hemet-San Jacinto Gas Company	9,441 89	95 70	10,100 20	530 26
H. G. Lacey Company	74,976 11	3,936 24	81,404 35	4,273 72
Holton Power Company	174,638 73	9,168 54	192,665 49	10,114 94
Imperial Valley Gas Company	43,381 48	2,277 52	42,253 99	2,218 34
Jackson Gas Light Company	4,626 50	242 90	4,339 60	227 82
James A. Gunn, Jr.	870 07	45 68		
J. G. Peters	1,978 10	103 84	2,158 05	113 30
Joseph McDonald	8,796 66	461 82	8,274 39	434 40
Lake County Power and Irrigation Company			1,251 01	65 68
Lassen Electric Company	13,968 17	733 32	13,065 48	685 94
L. Goff	375 00	19 68		
Lompoc Light and Power Company	12,815 88	672 84	12,447 15	653 48
Long Beach Consolidated Gas Company	218,645 39	11,478 88	242,994 15	12,757 20
Los Angeles Gas and Electric Corporation	4,359,318 65	228,864 22	4,268,854 52	224,114 86
Loyalton Electric Light Company	3,630 09	190 58		
Madera Gas Company	7,709 79	404 76	10,298 53	540 68
Mariposa Commercial and Mining Company	2,102 05	110 36	3,662 57	192 28
McKinley Bros.	1,037 44	54 46	1,282 96	67 36
Mendocino Electric Light and Power Company	5,536 56	290 66	5,668 40	297 60
Middle Yuba Hydro-Electric Power Company	19,681 34	1,033 42	20,753 53	1,089 56
Midland Counties Public Service Corporation	190,292 87	9,990 38	193,645 84	10,166 40
Midway Gas Company			417,103 43	21,897 94
Modesto Gas, Light, Coal and Coke Company	39,907 74	2,095 16	41,927 70	2,201 20
Mt. Konocti Light and Power Company	13,328 73	699 76	15,224 79	799 30
Mt. Whitney Power and Electric Company	643,728 52	33,795 74	745,517 28	39,139 66
Napa Valley Electric Company	24,555 71	1,289 18	26,024 22	1,366 28
Needles Gas and Electric Company	26,847 95	1,409 52	31,769 45	1,667 90
Nevada-California Power Company, The	114,395 61	6,005 76	91,289 98	4,792 72
Northern California Power Company, Consolidated	715,533 45	37,565 50	707,528 02	37,145 22

SCHEDULE N—Concluded.

GAS AND ELECTRIC COMPANIES—Continued.

State Taxes Levied Against Gas and Electric Companies for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
Novato Light and Power Company	------	------	$3,397 68	$178 38
N. P. Jensen	$265 25	$13 92	233 69	12 26
Oakdale Gas Company	7,855 04	412 38	10,897 38	572 12
Oceanside Electric and Gas Company	7,403 55	388 68	7,103 15	372 92
Ojai Power Company	4,636 98	243 44	5,145 99	285 92
Ontario Power Company	100,745 75	5,289 14	100,216 59	5,261 38
Ontario-Upland Gas Company	26,586 01	1,395 76	30,453 01	1,598 78
Oro Electric Corporation	113,407 03	5,953 86	135,384 26	7,107 68
Oro Water, Light and Power Company	51,059 51	2,680 62	53,721 52	2,820 38
Pacific Gas and Electric Company	15,408,131 12	808,926 88	17,328,773 57	909,760 62
Pacific Light and Power Corporation	2,649,982 45	139,124 08	2,902,006 39	152,355 34
Pacific Power Company	21,517 63	1,129 68	15,958 72	837 84
Pacific Power Corporation	------	------	5,639 16	296 06
Palo Alto Gas Company	44,989 23	2,361 94	53,643 74	2,816 30
Pinole Light and Power Company	8,701 17	456 82	7,791 28	409 04
Plumas Light and Power Company	2,324 27	122 02	2,870 20	150 68
Point Arena Electric Light Company	3,000 80	157 54	2,978 80	156 38
Quincy Electric Light and Power Company	4.200 00	220 50	4,003 20	210 16
Rialto Light, Power and Water Company	6,231 39	327 14	7,392 02	388 08
Riverbend Gas and Water Company	------	------	2,224 35	116 78
R. J. Dillon and Dan Murphy	------	------	60,917 07	3,198 14
Rochester Oil Company	6,609 41	347 00	4,601 55	241 58
Rodeo Land and Water Company	11,119 52	583 78	------	------
Sacramento Gas Company	135,009 26	7,087 98	126,146 21	6.622 68
San Diego Consolidated Gas and Electric Company	1,372,669 98	72,065 18	1,538,331 40	80,762 56
San Joaquin Light and Power Corporation	1,709,386 68	89,742 80	1,698,910 48	89,192 80
Santa Barbara Gas and Electric Company	277,513 23	14,569 44	321,285 90	16,867 50
Santa Catalina Island Company	6,593 92	346 18	6,422 90	337 20
Santa Maria Gas and Power Company	39,576 40	2,077 76	47,113 27	2,473 44
Sierra and San Francisco Power Company	1,101,113 90	57,808 48	1,218,252 29	63,958 24
Sierra City Electric Company	------	------	600 00	31 50
Snow Mountain Water and Power Company	129,152 75	6,780 52	134,632 29	7,068 20
Southern California Edison Company	4,681,149 97	245,760 38	4.729,428 70	248,295 00
Southern California Gas Company	1,133,083 19	59,486 86	882,042 45	46,307 22
Southern Counties Gas Company of California	209,036 41	10,974 42	241,189 54	12,662 46
Southern Sierras Power Company	330,420 69	17,347 08	431,837 47	22,671 46

Southside Light and Power Company	57,580 30	3,022 96		
Standard Mining Company	1,050 12	55 12	1,754 31	92 10
Surprise Valley Electric Light and Power Company	3,584 03	188 16	3,946 17	207 18
Truckee Electric Light and Power Company	10.695 93	561 54	10,186 40	534 78
Truckee River General Electric Company, The	4,039 64	212 08	4,204 84	220 76
Tulare County Power Company	138,223 29	7,256 72	91,581 26	4,808 02
Tuolumne County Electric Power and Light Company	20,429 66	1,072 56	21,124 69	1,109 04
Tuolumne Electric Company	4,652 12	244 24	2,807 59	147 40
Tuolumne Transmission Company	8,233 55	432 26	6,877 04	361 04
Turlock Gas Company	12,792 38	671 60	13,772 26	723 04
Ukiah Gas Company	10,659 28	559 62	9,818 50	515 48
Union Oil Company of California	2,158 91	113 34	2,140 36	112 36
United Light and Power Company	151,422 22	7,949 66	271,168 71	14,236 36
United Light, Fuel and Power Company	43,009 15	2,257 98	52,269 32	2,744 14
Universal Electric and Gas Company	117,212 84	6,153 68	126,623 86	6,647 76
Vacaville Water and Light Company	14,354 70	753 62	14,984 25	786 68
Vallejo Electric Light and Power Company	80,194 10	4,210 20	82,901 01	4,352 30
Ventura County Power Company	187,530 93	9,845 38	196,146 40	10,297 68
Weaverville Electric Company	4,330 38	227 34	4,772 80	250 58
Western Fuel, Gas and Power Company	31,001 26	1,627 56	33,816 87	1,775 38
Western States Gas and Electric Company	1,111,621 59	58,360 14	1,177,004 99	61,792 76
West Coast Gas Company	29,379 49	1,542 42	27,571 28	1,447 50
West Sacramento Electric	21,876 71	1,148 52		
West Side Gas Company	20,677 44	1,085 56	18,080 48	949 22
Willits Water and Power Company	11,801 95	619 60	13,509 00	709 22
Yosemite Power Company	71,792 32	3,769 10	64,998 30	3,412 42
Totals	$13,401,724 75	$2,278,590 38	$46,505,013 22	$2,441,513 16

SCHEDULE O.

TELEGRAPH AND TELEPHONE COMPANIES.

State Taxes Levied Against Telephone and Telegraph Companies for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
Adelaide Rural Telephone Company	$525 00	$23 62	$597 14	$26 86
Ætna Telephone Company	28 55	1 28	14 47	66
Alpaugh Telephone and Telegraph Company	555 59	25 00	550 59	24 78
Alturas and Canby Telephone Company	81 00	3 61	75 00	3 38
Anderson and Balls Ferry Telephone Company	51 50	2 32	--------	--------
Arizona, California and Nevada Telephone Company	--------	--------	122 40	5 50
Aukum Telephone Line	700 00	31 50	1,400 00	63 00
A. W. Poe	186 96	8 42	202 65	9 12
Bear Creek and Anderson Telephone Line	254 60	11 46	447 50	20 14
Blake Independent Telephone System	1,793 50	80 70	1,304 25	58 70
Bridgeport Telephone and Telegraph Company	325 00	14 62	432 00	19 44
Butte Valley Telephone Company	247 28	11 12	455 23	20 48
Calaveras Telephone Company	1,708 14	76 88	2,214 65	99 66
California and Oregon Telegraph Company	2,276 87	102 46	--------	--------
California Northern Telephone and Telegraph Company	2,933 01	131 98	--------	--------
California Telephone and Light Company	48,805 48	2,196 24	50,115 03	2,255 18
Cambria Telephone Company	1,256 50	56 54	1,181 15	53 14
Campbell Telephone Company	299 75	13 48	402 26	18 20
Capay Valley Telephone Company	472 50	21 26	462 00	20 78
Central Telephone Company	3,970 50	178 68	4,001 00	180 04
Chas. P. Snyder	691 20	31 10	349 96	15 74
Chetco Southern Telephone Company	1,171 40	52 72	1,617 51	72 78
Chileno Valley Telephone Company	102 37	4 60	295 35	13 28
Chinese Camp, Jamestown and Sonora Telegraph Company	72 43	3 26	66 29	2 98
Coachella Valley Home Telephone and Telegraph Company	3,421 60	153 98	3,004 28	135 20
Coley-Craig-Escalon Telephone Company	1,644 59	74 00	1,853 95	83 42
Colfax Suburban Telephone Company	275 25	12 38	260 75	11 74
Colfax Telephone Exchange	1,485 00	66 82	1,920 00	86 40
Colusa County Telephone Company	28,071 73	1,263 22	29,048 12	1,307 16
Consolidated Securities Company	4,410 15	198 46	--------	--------
Consolidated Utilities Company	13,694 40	616 24	15,963 39	718 36
Corcoran Telephone and Telegraph Company	2,444 12	109 98	2,371 05	106 70
Corona Union Telephone and Telegraph Company	15,199 86	684 00	14,810 33	666 46
Delano-Linns Valley Telephone Company	56 75	2 56	100 43	4 52
Del Norte People's Telephone Company	4,630 25	208 36	5,634 61	253 56
Dos Palos Telephone Company, The	2,913 30	131 10	3,070 41	138 16

Downey Home Telephone and Telegraph Company	9,843 48	442 96	12,860 61	578 72
Dry Creek and Healdsburg Telephone Company	384 12	17 28	326 23	14 68
Ducor-California-Hot Springs Telephone and Telegraph Company	1,581 24	71 16	1,426 86	64 20
Eel River and Southern Telephone Company	7,843 49	352 96	7,933 62	357 02
E. J. Gann-Mariposa Telephone Company	102 00	4 58	102 00	4 58
Elk Grove Mutual Telephone Association	869 32	39 12	611 37	27 52
Empire Telephone Company	700 00	31 50	936 20	42 12
Evans Telephone Company, The	2,168 17	97 56	2,366 05	106 48
Federal Telegraph Company	38,915 00	1,751 18	48,581 00	2,186 28
Forest Hill Telephone Exchange	717 43	32 28	725 13	32 62
Fowler Independent Telephone Company	7,464 81	335 92	7,321 62	329 48
Gilroy Telephone Company	7,879 52	354 58	8,751 15	393 80
Glenn County Telephone Company	15,482 72	696 72	14,073 33	633 30
Guglielmetti Rural Telephone Company	1,498 10	67 42	1,541 31	69 36
Happy Valley Telephone Company	741 23	33 36	691 44	31 12
Healdsburg and Alexander Valley Telephone Company	86 88	3 90	934 22	42 04
H. E. Bigelow Telephone Company	2,558 29	115 12	3,002 87	135 12
Herbert Bass Telephone Line	2,193 58	98 72	1,962 81	88 32
Home Telephone and Telegraph Company (Los Angeles)	1,876,097 83	84,424 40	2,007,561 84	90,340 28
Home Telephone and Telegraph Company of Pasadena	269,534 92	12,129 08	288,846 68	12,998 10
Home Telephone and Telegraph Company of Santa Barbara	108,350 50	4.875 78	113,704 54	5,116 70
Home Telephone Company of Covina	38,087 38	1,713 94	39,002 31	1,755 10
Home Telephone Company (Colusa County)	14 70	66	12 60	56
Honey Lake Valley Mutual Telephone Company	3,865 71	173 96	3,827 53	172 24
Hughson Telephone Company	2,385 29	107 34	2,492 60	112 16
Huntington Beach Company	5,055 76	227 50	5,578 39	251 02
Imperial Telephone Company	56,263 15	2,531 84	62,192 34	2,798 66
Independent Telephone Company	12 00	54	12 00	54
Interstate Telegraph Company	22,205 05	999 22	23,787 29	1,070 42
Ione Valley Telephone Line	187 50	8 44	250 00	11 24
J. C. Danner	580 00	26 10	600 00	27 00
J. V. Leithold-Knights Landing Telephone Line	617 00	27 76	1,008 33	45 38
Keeler-Darwin Telephone Line	345 58	15 56	246 29	11 08
Kerman Telephone Company	2,501 82	112 58	2,606 04	117 28
Kern Mutual Telephone Company	52,201 53	2,349 06	51,848 46	2,333 18
Klamath Rural Telephone Line	23 55	1 06	74 60	3 36
Klamath Telephone and Telegraph Company	1,551 60	69 82	2,138 54	96 24
Lake County Telephone Association	607 36	27 34	570 55	25 68
Lakeville Telephone Company	300 50	13 52	300 00	13 50
Latrobe Telephone Company	23 70	1 06	22 87	1 02
Lemon Cove Telephone Exchange	620 22	27 90	704 79	31 72
Lindsay Home Telephone and Telegraph Company	7,616 88	342 76	7,887 50	354 94
Little Shasta Telephone Company	108 00	4 86	108 00	4 86
Los Gatos Telephone Company	12,282 83	552 72	13,016 15	585 72

SCHEDULE O—Concluded.

TELEGRAPH AND TELEPHONE COMPANIES—Continued.

State Taxes Levied Against Telephone and Telegraph Companies for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
Lost Hills Telephone and Telegraph Company	$3,297 18	$148 38	$2,869 42	$129 12
Manteca Telephone and Telegraph Company	1,464 80	65 92	1,814 29	83 00
Marconi Wireless Telegraph Company of America	2,822 89	127 04	7,308 28	328 88
McCloud River Lumber Company, The	774 14	34 84	720 43	32 42
McFarland Telephone Company	315 00	14 18	767 83	34 56
Melburne Telephone Company	87 60	3 94	98 00	4 40
Merquin Telephone and Electric Light Company	626 00	28 16	----	----
Monrovia Telephone and Telegraph Company	21,225 06	955 12	22,269 11	1,002 10
Morgan Hill Telephone Company	1,747 56	78 64	1,777 03	79 96
Mount Diablo Telephone Company	69 60	3 14	----	----
Mrs. Frank Oleese	249 53	11 22	235 50	10 60
Needles Gas and Electric Company	1,775 70	79 90	1,757 04	79 06
Nevada-California-Oregon Telephone and Telegraph Company	19,311 36	869 02	22,337 28	1,005 18
New Freeport Telephone and Telegraph Company	19,020 22	855 90	22,474 47	1,011 36
Northern Trinity Telephone and Telegraph Company	567 59	25 54	554 23	24 94
Novato Rural Telephone Company	1,698 52	76 44	1,827 83	82 26
Oleta Telephone Company	70 00	3 14	----	----
Ontario-Upland Telephone Company	37,378 22	1,682 02	40,419 81	1,818 90
Oxnard Home Telephone Company	19,036 38	856 64	19,856 77	893 56
Pacific Telephone and Telegraph Company, The	12,728,910 92	572,801 00	14,073,213 53	633,294 60
Paso Robles and Shandon Telephone Company	2,131 30	95 90	2,858 81	128 64
Petrolia Telephone Company	663 18	29 81	655 33	29 48
Placer County Telephone Company	736 20	33 12	1,493 00	67 18
Pomona Valley Telephone and Telegraph Union	71,529 72	3,218 84	70,952 54	3,192 86
Postal Telegraph-Cable Company	118,421 85	5,328 98	128,946 42	5,802 58
Raymond Telephone Company	4,261 46	191 76	4,549 80	204 74
Red Hill Telephone Company	150 30	6 76	173 32	7 80
Redondo Home Telephone Company	7,519 27	338 36	7,154 21	321 94
Reedley Telephone Company	6,501 14	292 56	7,505 31	337 74
Rio Vista Telephone and Telegraph Company	4,477 95	201 50	4,932 80	221 98
Riverside Home Telephone and Telegraph Company	26,810 54	1,206 48	23,384 33	1,052 30
Robert L. Swanson Telephone System	611 50	27 52	564 80	25 42
Roseville Telephone Company	8,094 16	364 24	8,848 71	398 20
Sacramento Valley Telephone Company	----	----	5,210 58	234 48
San Antonio Home Telephone Company	1,004 98	45 22	1,053 36	47 40
San Diego Home Telephone Company	146,212 79	6,579 58	123,658 57	5,564 64

San Fernando Telephone and Telegraph Company	3,332 41	149 96	8,121 05	365 44
San Fernando Valley Home Telephone Company	17,736 00	798 12	16,020 28	720 92
Sanger Telephone Company	4,721 39	212 46	4,807 37	216 34
San Joaquin Valley Farm Lands Company	197 24	8 88		
San Joaquin Valley Telephone Company	1,073 29	48 30	1,552 60	69 86
San Luis Rey Co-operative Telephone Association	124 95	5 62	120 25	5 42
San Miguel Interurban Telephone Company	583 02	26 24	390 07	17 56
Santa Monica Bay Home Telephone Company	47,865 21	2,153 94	49,160 48	2,212 22
Santa Paula Home Telephone Company	12,069 24	543 12	11,998 65	539 94
Searchlight Western Telephone System	282 00	12 70	300 00	13 50
Shasta Land and Timber Company	98 30	4 42	48 35	2 18
Shelley Inch, Sr.	8,125 70	365 66	8,392 65	377 66
Shenandoah Valley Telephone Company	59 50	2 68	42 00	1 88
Sierra Madre Telephone and Telegraph Company	7,928 79	356 80	8,496 10	382 32
Sierra Telegraph Company	123 92	5 58	96 91	4 36
Siskiyou Telephone Company, The	5,977 83	269 00	5,783 59	260 26
Smeltzer Home Telephone and Telegraph Company	6,334 99	285 08	5,265 28	236 94
Southwestern Home Telephone Company	77,535 45	3,489 10	79,625 89	3,583 16
Stephens Bros. and Peirano	91 70	4 12	168 75	7 60
Suisun and Green Valley Telephone Company	324 00	14 58	387 00	17 42
Sunland Rural Telephone Company	1,299 41	58 48	1,481 48	66 66
Tehama County Telephone Company	6,882 82	309 72	6,818 76	306 84
Tognini and Ghezzi	391 85	17 64	444 60	20 00
Tulare Home Telephone and Telegraph Company, The	16,034 73	721 56	17,043 87	766 98
Tuolumne Telephone Exchange	1,572 81	70 78	1,397 16	62 88
Turlock Home Telephone and Telegraph Company	15,516 93	698 26	14,757 45	664 08
Union Home Telephone and Telegraph Corporation	155,639 00	7,003 76	157,205 73	7,074 26
United States Long Distance Telephone and Telegraph Company	286,899 20	12,910 46	311,626 09	14,023 18
Upper Dry Creek Telephone Company	342 80	15 42	499 00	22 46
Upper Mattole Telephone Company	49 15	2 22	36 65	1 64
Valley Telephone Company	3,849 34	173 22	5,704 35	256 70
Volcano Telephone and Telegraph Company	1,700 00	76 50	1,978 45	89 04
Weaverville Supply Company	317 17	14 28	251 85	11 34
Weaverville Telephone Exchange	886 13	39 88	937 54	42 18
Weed Lumber Company	445 16	20 04	138 83	6 24
Western Union Telegraph Company	795,721 21	35,807 46	886,769 09	39,904 60
West Side Telephone Company of Healdsburg	144 04	6 48	229 13	10 32
Wheatville Telephone Company	180 00	8 10		
Whittier Home Telephone and Telegraph Company	39,872 69	1,794 28	42,023 21	1,891 04
Willits Telephone and Telegraph Company	2,547 32	114 62	2,472 74	111 28
Totals	$17,493,676 97	$787,215 46	$19,151,760 80	$861,829 24

SCHEDULE P.

CAR COMPANIES.

State Taxes Levied Against Car Companies for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
American Refrigeration Transit Company	$1,640 60	$64 80	$1,286 54	$50 82
California Dispatch Line	16,406 37	648 06	20,384 93	805 20
Live Poultry Transit Company	650 16	25 68	599 20	23 66
Pacific Fruit Express Company	760,025 29	30,021 00	743,109 04	29,352 80
Pullman Company, The	1,853,402 52	73,209 40	3,087,144 86	121,942 22
Santa Fe Refrigerator Despatch Company	335,633 07	13,257 50	315,195 86	12,450 24
Swift Refrigerator Transportation Company	2,498 37	98 68	2,715 64	107 26
Union Refrigerator Transit Company	2,955 03	116 72	3,099 22	122 42
Union Tank Line Company	134,675 36	5,319 68	119,305 05	4,712 54
Totals	$3,107,886 77	$122,761 52	$4,292,840 34	$169,567 16

SCHEDULE P-a.

EXPRESS COMPANIES.

State Taxes Levied Against Express Companies for the Years 1915 and 1916.

	Gross receipts to December 31, 1914	Total tax thereon	Gross receipts to December 31, 1915	Total tax thereon
American Express Company	$92,349 43	$1,477 58	$188,302 60	$3,012 84
Globe Express Company	45,360 26	725 76	14,504 61	232 08
Wells, Fargo & Company	4,755,769 13	76,092 30	5,058,840 18	80,941 44
Totals	$1,893,478 82	$78,295 64	$5,261,647 39	$84,186 36

SCHEDULE Q.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Alameda Savings Bank, Alameda	$3,967 72	$4,008 70
Citizens Savings Bank of Alameda, Alameda	634 72	775 70
Alhambra Savings Bank, Alhambra	571 54	603 40
Alturas State Bank, Alturas	364 84	372 88
Bank of Alameda County, Alvarado	964 20	810 30
American Savings Bank, Anaheim	380 44	387 72
German American Bank, Anaheim	657 36	663 64
Southern County Bank, Anaheim	661 74	667 14
Bank of Anderson, Anderson	205 90	--------------
Calaveras County Bank, Angels Camp	1,289 02	1,287 56
Antioch Bank of Savings, Antioch	278 44	274 76
Bank of Antioch, Antioch	1,504 58	1,470 16
Bank of Arbuckle, Arbuckle	804 66	786 20
Arcata Savings Bank, Arcata	377 78	455 36
Bank of Arcata, Arcata	2,849 60	2,876 44
Bank of Arroyo Grande, Arroyo Grande	536 90	546 26
Auburn Savings Bank, Auburn	658 06	661 42
Placer County Bank, Auburn	1,510 52	1,545 26
Azusa Valley Savings Bank, Azusa	434 26	416 42
First Bank of Kern, Bakersfield	1,568 58	1,615 46
Kern Valley Bank, Bakersfield	360 00	--------------
Producers Savings Bank, Bakersfield	1,637 20	1,814 08
Security Trust Company, Bakersfield	6,080 34	6,165 18
Bank of Beaumont, Beaumont	411 28	435 98
People's Bank of Benicia, Benicia	607 24	608 38
Berkeley Bank of Savings and Trust Company, Berkeley	7,845 64	7,456 20
Homestead Bank, Berkeley	1,118 38	1,158 84
South Berkeley Bank, Berkeley	720 68	604 80
University Savings Bank, Berkeley	1,657 76	1,216 76
West Berkeley Bank, Berkeley	571 68	597 38
Sacramento Valley Bank, Biggs	785 84	772 54
Inyo County Bank, Bishop	1,071 84	1,234 80
Owens Valley Bank, Bishop	821 58	844 30
Palo Verde Valley Bank, Blythe	291 54	331 86
American State Bank, Brawley	624 12	648 32
Imperial Valley Savings Bank of Brawley, Brawley	581 20	632 68
La Habra Valley Bank, Brea	310 00	293 08
Bank of Brentwood, Brentwood	258 38	260 24
Burbank Savings Bank, Burbank	318 70	337 58
Farmers and Merchants Bank, Burbank	279 58	290 94
Bank of Burlingame, Burlingame	497 52	499 54
Bank of Cambria, Cambria	594 22	598 52
Bank of Campbell, Campbell	615 96	632 26
Commercial and Savings Bank, Carpinteria	284 68	274 36
Surprise Valley Bank, Cedarville	529 18	562 80
Bank of Centerville, Centerville	1,122 00	987 52
Bank of Ceres, Ceres	342 20	348 38
Bank of Chico, Chico	1,323 84	1,064 96
Butte County Savings Bank, Chico	1,395 94	1,273 66
People's Savings and Commercial Bank, Chico	793 94	772 98
Chino Savings Bank, Chino	331 58	345 34
Bank of Chowchilla, Chowchilla	306 82	269 52
Chula Vista State Bank, Chula Vista	307 28	309 08
People's State Bank, Chula Vista	333 18	331 30
Bank of Cloverdale, Cloverdale	921 92	953 90
First State Bank of Clovis, Clovis	423 40	427 92
Bank of Coalinga, Coalinga	741 36	516 36
Colfax Bank, Colfax	336 36	340 66
Colusa County Bank, Colusa	10,033 46	9,689 18
First Savings Bank of Colusa, Colusa	289 50	302 76
Citizens Savings Bank of Compton, Compton	400 06	417 66
Farmers and Merchants Bank, Compton	265 90	270 26
Bank of Concord, Concord	369 44	404 88
Bank of Corning, Corning	392 76	432 08

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*Shown by cities in alphabetical order.

SCHEDULE Q—Continued.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Tehama County Savings Bank, Corning	$339 76	$352 68
Citizens Bank, Corona	358 86	348 32
Covina Valley Savings Bank, Covina	601 48	637 82
Bank of Crescent City, Crescent City	352 08	385 86
Del Norte County Bank, Crescent City	659 98	678 56
Culver City Commercial and Savings Bank, Culver City	347 38	318 62
Bank of Davis, Davis	321 62	360 44
Dinuba Savings Bank, Dinuba	330 62	334 46
Bank of Dixon, Dixon	3,282 46	3,192 96
Northern Solano Savings Bank, Dixon	226 00	251 48
Butte Valley State Bank, Dorris	433 06	403 48
Bank of Dos Palos, Dos Palos	292 40	--------------
Bank of Downey, Downey	396 40	399 60
Los Nietos Valley Bank, Downey	1,083 20	1,089 26
State Bank of Dunsmuir, Dunsmuir	304 70	292 62
Commercial Bank of Durham, Durham	281 96	290 14
Eagle Rock Bank, Eagle Rock	276 66	279 28
East San Diego State Bank, East San Diego	305 80	329 28
Cuycamaca State Bank, El Cajon	377 04	353 74
Security Commercial and Savings Bank, El Centro	306 42	319 96
Bank of Elk Grove, Elk Grove	296 20	271 06
El Segundo State Bank, El Segundo	346 40	354 90
Consolidated Bank of Elsinore, Elsinore	347 52	338 92
First Savings Bank, Emeryville	391 28	403 40
Escalon State Bank, Escalon	289 70	299 38
Escondido Savings Bank, Escondido	523 92	538 16
Home Savings Bank, Escondido	351 08	349 32
Bank of Esparto, Esparto	322 88	336 76
Bank of Eureka, Eureka	3,384 58	3,408 08
Home Savings Bank, Eureka	2,025 36	2,119 82
Savings Bank of Humboldt County, Eureka	2,274 72	2,209 46
Fair Oaks Bank, Fair Oaks	260 52	265 78
Citizens Commercial Bank, Fallbrook	312 12	316 76
Ferndale Bank, Ferndale	1,198 88	1,212 80
Russ Williams Banking Company, Ferndale	406 98	386 44
Fillmore State Bank, Fillmore	821 24	1,191 34
Bank of Folsom, Folsom	296 12	286 72
Bank of Fort Bidwell, Fort Bidwell	304 34	342 26
First Bank of Savings, Fort Bragg	336 60	322 24
Fort Bragg Commercial Bank, Fort Bragg	321 32	322 48
Mount Shasta Banking Company, Fort Jones	245 68	191 66
Scott Valley Bank, Fort Jones	1,804 82	1,866 06
Bank of Fortuna, Fortuna	472 90	470 12
Bank of Central California, Fresno	3,947 02	3,943 14
Fresno Savings Bank, Fresno	754 50	753 84
Industrial Bank of Fresno, Fresno	249 44	254 44
People's Savings Bank, Fresno	3,369 88	3,705 24
Fullerton Savings Bank, Fullerton	461 22	465 32
Bank of Galt, Galt	304 20	305 70
Citizens State Savings Bank, Gardena	314 96	320 34
Bank of Garden Grove, Garden Grove	351 48	312 42
Bank of Geyserville, Geyserville	463 82	419 34
Bank of Gilroy, Gilroy	1,873 74	1,916 48
Bank of Glendale, Glendale	742 02	755 92
Glendale Savings Bank, Glendale	622 76	616 00
First Savings Bank, Glendora	261 96	270 54
Glendora Bank, Glendora	607 34	576 22
Bank of Gonzales, Gonzales	746 36	767 12
Nevada County Bank, Grass Valley	1,792 42	1,829 90
Indian Valley Bank, Greenville	261 28	250 12
Gridley State Bank, Gridley	399 96	355 04
Bank of Guerneville, Guerneville	368 26	361 42
Bank of Gustine, Gustine	1,187 10	1,216 12
Bank of Half Moon Bay, Half Moon Bay	404 98	402 56

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*Shown by cities in alphabetical order.

SCHEDULE Q—Continued.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Hanford Savings Bank, Hanford	$1,049 02	$1,049 04
Old Bank, The, Hanford	1,166 16	978 22
People's Savings Bank, Hanford	870 78	875 80
Bank of Haywards, Hayward	452 68	450 46
Farmers and Merchants Bank, Hayward	784 92	767 00
Haywards Bank of Savings, Hayward	752 28	675 36
Farmers and Mechanics Savings Bank, Healdsburg	765 18	815 44
Healdsburg Savings Bank, Healdsburg	408 68	473 92
Bank of Hemet, Hemet	1,038 22	423 24
Farmers and Merchants Bank, Hemet	399 42	415 58
First Bank of Hermosa Beach, Hermosa Beach	282 48	318 56
Bank of Highgrove, Highgrove	313 28	314 92
First Bank of Highland, Highland	494 52	516 52
Bank of Hollister, Hollister	6,744 24	6,959 82
Hollister Savings Bank, Hollister	781 16	835 50
Savings and Loan Bank of San Benito County, Hollister	2,281 94	2,436 16
Citizens Savings Bank of Hollywood, Hollywood	559 32	629 10
Hollywood Savings Bank, Hollywood	277 98	299 12
Holtville Bank, Holtville	313 02	400 08
Bank of Hopland, Hopland	311 12	318 36
Bank of Hueneme, Hueneme	782 82	755 40
Bank of Hughson, Hughson	288 66	290 22
Savings Bank of Huntington Beach, Huntington Beach	310 30	332 18
Bank of Huntington Park, Huntington Park	285 82	296 18
Farmers and Merchants Bank, Imperial	438 80	391 12
Citizens Savings Bank, Inglewood	295 62	302 84
Bank of Amador County, Jackson	1,528 98	1,739 52
First Bank of Jamestown, Jamestown	315 40	317 08
Kingsburg Bank, Kingsburg	418 90	425 16
First Bank of La Habra, La Habra	319 66	317 46
Bank of Lake, Lakeport	883 84	805 14
Farmers Savings Bank, Lakeport	1,540 52	1,517 74
Bank of La Mesa, La Mesa	357 74	360 82
Antelope Valley Bank, Lancaster		578 24
Bank of Lancaster, Lancaster	305 08	
Farmers and Merchants Bank, Lancaster	291 64	
Bank of Lankershim, Lankershim	258 42	262 22
Le Grand Bank, Le Grand	330 76	337 98
Bank of Lemoore, Lemoore	1,263 22	1,421 26
Bank of Lincoln, Lincoln	582 74	540 14
Bank of Western Placer, Lincoln	304 42	265 20
Lindsay Savings Bank, Lindsay	352 32	379 58
Livermore Savings Bank, Livermore	362 38	388 88
Livermore Valley Savings Bank, Livermore	391 58	810 48
First Bank of Livingston, Livingston	300 36	314 26
Bank of Lodi, Lodi	1,712 36	1,586 36
Central Savings Bank, Lodi	411 60	329 38
Bank of Loleta, Loleta	303 36	310 08
Bank of Lompoc, Lompoc	2,037 48	1,890 60
Farmers and Merchants Savings Bank, Lompoc	543 08	503 34
Lompoc Valley Bank, Lompoc	888 64	856 82
Lompoc Valley Savings Bank, Lompoc	439 60	464 98
Farmers and Merchants Bank, Long Beach	1,787 86	1,785 14
Long Beach Savings Bank and Trust Company, Long Beach	3,447 66	3,452 06
Marine Commercial and Savings Bank, Long Beach	1,636 44	1,648 04
Bank of Loomis, Loomis	318 76	320 98
Farmers and Merchants Bank, Lordsburg		331 16
Bank of Southern California, Los Angeles	202 24	133 08
California Savings and Commercial Bank, Los Angeles		7,032 74
California Savings Bank, Los Angeles	4,365 98	
Citizens Trust and Savings Bank, Los Angeles	7,937 92	8,174 96
Farmers and Merchants Bank, Los Angeles	387 08	348 36
German American Trust and Savings Bank, Los Angeles	28,061 84	29,157 60
Hellman Commercial Trust and Savings Bank, Los Angeles	13,616 48	10,015 82
Hibernian Savings Bank, Los Angeles	4,274 62	4,973 72

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*Shown by cities in alphabetical order.

SCHEDULE Q—Continued.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Highland Park Bank, Los Angeles	$391 08	$424 72
Home Savings Bank, Los Angeles	12,329 50	12,739 64
International Savings and Exchange Bank, Los Angeles	3,064 42	3,204 04
Kaspare Cohn Commercial and Savings Bank, Los Angeles	3,629 14	3,662 82
Los Angeles Trust and Savings Bank, Los Angeles	30,708 80	32,754 64
Oil and Metals Bank and Trust Company, Los Angeles	77 20	----------
Security Trust and Savings Bank, Los Angeles	43,911 48	44,482 86
Southern Trust Company, Los Angeles	2,949 68	----------
Traders Bank of Los Angeles, Los Angeles	3,186 06	----------
Bank of Los Banos, Los Banos	1,561 74	1,676 08
Bank of Los Gatos, Los Gatos	1,216 70	1,269 10
Sierra Valley Bank, Loyalton	315 24	304 68
Madera Savings Bank, Madera	358 74	388 96
First State Bank of Manteca, Manteca	315 78	318 24
Bank of Maricopa, Maricopa	257 58	255 68
Bank of Martinez, Martinez	2,376 86	2,401 26
Decker, Jewett & Co. Bank, Marysville	2,487 40	2,390 68
Northern California Bank of Savings, Marysville	2,317 38	2,144 86
Rideout Bank, Marysville	6,434 94	6,135 74
Mayfield Bank, Mayfield	296 84	304 86
Mendocino Bank of Commerce, Mendocino	476 34	462 26
Commercial Savings Bank, Merced	1,405 32	1,230 64
Merced Security Savings Bank, Merced	4,528 66	4,534 16
Bank of Mill Valley, Mill Valley	504 96	525 46
Bank of Milpitas, Milpitas	366 78	370 26
Farmers and Merchants Bank, Modesto	1,060 36	1,102 14
Modesto Bank, Modesto	3,875 36	3,941 54
Modesto Savings Bank, Modesto	1,907 90	2,232 38
Security Savings Bank of Stanislaus County, Modesto	584 02	629 96
Union Savings Bank, Modesto	1,891 82	2,028 82
Moneta Commercial Bank, Moneta	324 92	347 16
Granite Savings Bank, Monrovia	352 26	358 50
Monrovia Savings Bank, Monrovia	794 42	837 44
Montague Banking Company, Montague	658 72	665 24
Montebello State Bank, Montebello	281 52	279 66
Bank of Monterey, Monterey	1,372 34	1,432 40
Monterey Savings Bank, Monterey	698 88	657 34
Bank of Morgan Hill, Morgan Hill	411 92	407 52
Farmers and Merchants State Bank, Mountain View	850 78	888 60
Bank of Napa, Napa	3,767 98	3,795 52
Jas. H. Goodman & Co. Bank, Napa	1,397 14	1,420 44
Napa Savings Bank, Napa	443 48	442 00
National City State Bank, National City	301 54	296 18
Bank of Needles, Needles	350 96	339 90
Monaghan & Murphy Bank, Needles	1,035 84	924 20
Citizens Bank, Nevada City	1,724 10	1,881 30
Bank of Newcastle, Newcastle	430 08	454 02
Bank of Newman, Newman	1,680 52	1,705 02
Niles State Bank, Niles	273 94	275 30
Ojai State Bank, Nordhoff	499 68	538 98
Bank of Norwalk, Norwalk	4[illegible]3 32	445 64
Novato Bank, Novato	325 38	328 78
Commercial State Bank, Oakdale	603 88	631 74
Stanislaus County Savings Bank, Oakdale	727 20	837 42
Bankers Trust Company, Oakland	46 10	49 56
Bank of Commerce, Oakland	1,286 48	931 76
Bank of Fruitvale, Oakland	638 60	659 06
Central Savings Bank, Oakland	4,579 02	6,612 76
Citizens Bank of Fruitvale, Oakland	307 20	329 44
Farmers and Merchants Savings Bank, Oakland	1,788 34	2,040 04
First Savings Bank, Oakland	5,792 82	4,277 08
Oakland Bank of Savings, Oakland	22,407 50	23,916 44
Security Bank, Oakland	3,917 06	3,893 12
State Savings Bank, Oakland	3,008 54	3,080 90
Twenty-third Avenue Bank, Oakland	401 62	422 48

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*Shown by cities in alphabetical order.

SCHEDULE Q—Continued.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Union Savings Bank, Oakland	$8,730 64	$174 48
Western Commercial and Savings Bank, Oakland	1,529 50	1,526 92
West Oakland Bank, Oakland	324 00	------
Euclid Savings Bank, Ontario	312 60	322 58
Orange Savings Bank, Orange	621 76	686 32
Security Savings Bank, Orange	378 28	405 70
Bank of Orland, Orland	795 74	797 72
Orland Savings Bank, Orland	354 98	365 84
Bank of Oroville, Oroville	537 62	582 86
Bank of Rideout, Smith & Co., Oroville	502 74	437 98
State Bank of Owensmouth, Owensmouth	502 20	473 98
Bank of A. Levy, Inc., Oxnard	5,673 74	6,037 14
Oxnard Savings Bank, Oxnard	868 84	925 84
Bank of E. Cooke Smith, Pacific Grove	623 76	504 38
Bank of Pacific Grove, Pacific Grove	855 52	770 14
Bank of Palo Alto, Palo Alto	1,068 62	993 38
Citizens Savings Bank, Pasadena	3,386 02	2,740 10
Crown City Trust and Savings Bank, Pasadena	2,232 00	2,204 22
Pasadena Trust and Savings Bank, Pasadena	4,214 60	4,366 46
State Bank of Pasadena, Pasadena	451 52	464 88
Union Trust and Savings Bank, Pasadena	6,000 64	6,311 12
Citizens Bank, Paso Robles	785 56	1,112 68
Bank of Patterson, Patterson	372 96	370 72
Bank of Perris, Perris	377 62	376 18
California Savings Bank, Petaluma	1,705 50	1,876 32
Petaluma Savings Bank, Petaluma	1,739 10	1,777 84
Petaluma Swiss-American Bank, Petaluma	3,451 28	3,613 40
Bank of Pinole, Pinole	1,049 56	1,201 74
Contra Costa County Bank, Pittsburg	768 54	848 66
A. Mierson Banking Company, Placerville	1,196 48	1,271 66
Bank of Planada, Planada	340 84	339 06
Amador Valley Savings Bank, Pleasanton	307 14	322 32
Bank of Pleasanton, Pleasanton	667 58	577 68
Bank of Point Arena, Point Arena	342 34	327 74
Savings Bank of Pomona, Pomona	858 56	904 72
State Bank of Pomona, Pomona	977 34	1,197 44
Pioneer Bank, Porterville	1,484 24	1,353 10
Bank of Princeton, Princeton	767 80	779 64
Plumas County Bank, Quincy	345 78	268 82
State Bank of Ramona, Ramona	310 58	312 66
Bank of Tehama County, Red Bluff	7,097 16	7,166 20
Bank of Shasta County, Redding	175 46	------
First Savings Bank of Shasta County, Redding	1,019 18	1,092 80
Redding Savings Bank, Redding	657 50	670 38
Savings Bank of Redlands, Redlands	1,012 10	968 70
Union Savings Bank, Redlands	1,170 26	1,188 44
Redondo Savings Bank, Redondo Beach	366 04	365 08
Redwood City Commercial Bank, Redwood City	847 62	851 58
San Mateo County Savings Bank, Redwood City	1,423 58	1,613 30
Savings and Loan Company of San Mateo County, Redwood City	301 20	355 20
Bank of Richmond, Richmond	558 94	564 78
Mechanics Bank, Richmond	756 78	824 18
Richmond Savings Bank, Richmond	724 24	770 82
Bank of Rio Vista, Rio Vista	1,125 16	1,316 96
Bank of Ripon, Ripon	306 94	334 06
Rivera State Bank, Rivera	318 92	323 22
Citizens Bank of Arlington, Riverside	397 06	421 18
People's Loan and Trust Company, Riverside	------	1,912 58
Riverside Savings Bank, Riverside	1,584 06	1,596 62
Security Savings Bank, Riverside	938 28	1,019 36
Roseville Banking Company, Roseville	632 02	671 26
California Savings Bank, Sacramento	1,755 32	2,028 20
Capital Bank and Trust Company, Sacramento	1,456 48	------
Citizens Bank of Oak Park, Sacramento	316 72	311 04
Farmers and Mechanics Savings Bank, Sacramento	3,230 00	3,598 20

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*Shown by cities in alphabetical order.

SCHEDULE Q—Continued.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Japanese Bank of Sacramento, Sacramento	$72 00	-------------
Nippon Bank, Sacramento	532 92	$545 88
People's Savings Bank, Sacramento	6,209 98	6,502 06
Sacramento Bank, Sacramento	14,406 18	15,293 58
Sacramento Valley Bank and Trust Company, Sacramento	7,666 04	7,803 58
Bank of St. Helena, St. Helena	1,208 84	1,192 64
Savings Bank of St. Helena, St. Helena	410 80	432 84
Monterey County Bank, Salinas	2,520 58	2,591 84
Salinas City Bank, Salinas	4,529 94	4,566 84
Salinas Valley Savings Bank, Salinas	837 60	784 56
First Bank of San Anselmo, San Anselmo	391 20	409 56
California State Bank, San Bernardino	1,373 46	1,329 66
San Bernardino County Savings Bank, San Bernardino	2,687 80	2,942 94
Savings Bank of San Bernardino, San Bernardino	734 28	658 40
Bank of Commerce and Trust Company, San Diego	9,409 36	9,664 80
Citizens Savings Bank, San Diego	1,542 84	1,454 54
San Diego Savings Bank, San Diego	7,098 50	7,386 14
Security Commercial and Savings Bank, San Diego	1,467 82	1,404 22
Southern Trust and Savings Bank, San Diego	5,439 54	5,369 46
University Avenue Bank, San Diego	707 24	709 20
San Dimas Savings Bank, San Dimas	323 78	328 88
Anglo-California Trust Company, San Francisco	21,912 00	22,167 80
Bank of British North America, San Francisco	3,724 80	3,816 44
Bank of Italy, San Francisco	16,931 24	17,417 02
California Safe Deposit and Trust Company, San Francisco	3,458 46	-------------
Canadian Bank of Commerce, San Francisco	11,163 80	13,146 02
Canton Bank, San Francisco	1,866 20	1,716 08
City and County Bank, San Francisco	302 98	-------------
Columbus Savings and Loan Society, San Francisco	3,059 36	3,083 94
Donahoe-Kelly Banking Company, San Francisco	10,808 96	10,817 26
First Federal Trust Company, San Francisco	10,961 92	12,282 26
French-American Bank of Savings, San Francisco	9,718 04	10,041 16
Fugazi Banca Popolare Operaia Italiana, San Francisco	5,073 50	5,341 74
German Savings and Loan Society, San Francisco	35,247 20	36,573 08
Hibernian Savings and Loan Society, San Francisco	33,234 52	29,014 20
Hongkong-Shanghai Banking Corporation, San Francisco	600 00	600 00
Humboldt Savings Bank, San Francisco	4,783 60	6,721 50
International Banking Corporation, San Francisco	4,680 00	4,956 00
Italian-American Bank, San Francisco	9,599 46	9,423 90
Japanese-American Bank, San Francisco	1,320 00	-------------
Kimmon Ginko, San Francisco	120 00	-------------
Marine Bank, San Francisco	1,749 64	1,721 16
Mission Bank, San Francisco	2,923 08	2,861 34
Mission Savings Bank, San Francisco	1,706 20	2,271 20
Mutual Savings Bank, San Francisco	5,147 68	6,535 04
Portuguese-American Bank, San Francisco	3,984 94	3,972 60
Savings Union Bank and Trust Company, San Francisco	39,732 74	40,282 70
Security Savings Bank, San Francisco	10,476 32	10,391 74
State Savings and Commercial Bank, San Francisco	120 00	-------------
Swedish-American Bank, San Francisco	28 50	35 26
Union State Bank, San Francisco	9 60	-------------
Union Trust Company, San Francisco	29,484 12	30,028 24
Western Metropolis Savings Bank, San Francisco	1,034 40	-------------
Yokahoma Specie Bank, Ltd., San Francisco	4,931 22	5,658 04
Bank of San Gabriel, San Gabriel	317 06	218 02
Commercial Bank, Sanger	443 92	499 00
First Savings Bank, San Jacinto	332 62	339 92
Bank of San Jose, San Jose	4,295 50	3,981 32
Garden City Bank and Trust Company, San Jose	5,486 56	5,498 76
San Jose Safe Deposit Bank of Savings, San Jose	10,977 38	10,827 64
Security Savings Bank, San Jose	1,892 06	2,088 78
Security State Bank, San Jose	1,833 98	1,953 66
Bank of San Leandro, San Leandro	1,642 16	1,549 56
San Leandro State Bank, San Leandro	713 08	714 84
Bank of San Luis Obispo, San Luis Obispo	148 24	-------------

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*Shown by cities in alphabetical order.

SCHEDULE Q—Continued.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Commercial Bank, San Luis Obispo	$5,172 42	$5,621 90
County Bank of San Luis Obispo, San Luis Obispo	9 42	13 04
Bank of San Pedro, San Pedro	504 14	505 84
Citizens Savings Bank, San Pedro	437 24	429 80
Harbor City Savings Bank, San Pedro	456 08	450 90
State Bank of San Pedro, San Pedro	776 22	797 90
Bank of San Rafael, San Rafael	1,618 46	1,729 98
Marin County Savings Bank, San Rafael	881 60	1,038 32
Citizens Commercial and Savings Bank, Santa Ana	637 00	625 30
Home Savings Bank, Santa Ana	812 82	788 36
Orange County Savings and Trust Company, Santa Ana	3,472 90	4,115 82
Santa Ana Savings Bank, Santa Ana	799 80	834 84
Central Bank, Santa Barbara	628 32	658 06
Commercial Bank, Santa Barbara	2,911 06	3,052 86
Santa Barbara Savings and Loan Bank, Santa Barbara	3,172 96	3,456 30
Mission Bank of Santa Clara, Santa Clara	376 30	390 24
Santa Clara Valley Bank, Santa Clara	1,702 84	720 00
City Savings Bank, Santa Cruz	1,992 94	2,290 88
People's Savings Bank, Santa Cruz	535 72	547 28
Santa Cruz Bank of Savings and Loan, Santa Cruz	1,563 52	1,540 52
Bank of Santa Maria, Santa Maria	4,638 58	4,887 22
Valley Savings Bank, Santa Maria	709 70	712 96
Bank of Santa Monica, Santa Monica	1,718 02	1,776 82
Merchants Commercial and Savings Bank of Ocean Park, Santa Monica	585 16	599 10
Ocean Park Bank, Santa Monica	1,168 34	1,131 48
Farmers and Merchants Bank, Santa Paula	1,084 44	1,103 72
Santa Paula Savings Bank, Santa Paula	650 92	697 18
Exchange Bank, Santa Rosa	2,775 98	2,854 52
Santa Rosa Bank, Santa Rosa	1,884 72	1,890 76
Savings Bank of Santa Rosa, Santa Rosa	4,286 24	3,605 82
Union Savings Bank, Santa Rosa	871 50	863 20
Saratoga State Bank, Saratoga	314 98	300 72
Bank of Sausalito, Sausalito	386 20	501 32
Citizens State Bank, Sawtelle	746 34	739 54
Analy Savings Bank, Sebastopol	741 36	744 84
Sebastopol Savings Bank, Sebastopol	422 30	402 72
Farmers Savings Bank, Selma	330 20	331 84
Selma Savings Bank, Selma	685 44	656 48
Bank of Sherman, Sherman	311 62	296 28
Santa Ynez Valley Bank, Solvang	270 10	263 28
Sonoma Valley Bank, Sonoma	1,493 42	1,576 68
Tuolumne County Bank, Sonora	764 30	796 46
South Pasadena Savings Bank, South Pasadena	392 46	391 72
Bank of South San Francisco, South San Francisco	828 58	788 06
Stirling City Bank, Stirling City	385 10	325 44
Commercial and Savings Bank, Stockton	5,845 44	4,807 82
Farmers and Merchants Bank, Stockton	9,711 06	9,454 02
San Joaquin Valley Bank, Stockton	8,051 42	5.266 54
Stockton Savings and Loan Society, Stockton	7,773 18	8,549 86
Stockton Savings Bank, Stockton	5.502 82	5,605 28
Union Safe Deposit Bank, Stockton	1,972 66	1,966 44
Bank of Suisun, Suisun	8,332 48	8,638 40
Solano County Savings Bank, Suisun	399 66	277 16
Bank of Sunnyvale, Sunnyvale	396 64	391 30
Bank of Lassen County, Susanville	1,617 52	1,645 88
Lassen Industrial Bank, Susanville	801 74	805 12
Bank of Tehachapi, Tehachapi	696 26	730 22
Bank of Tomales, Tomales	1,490 08	1,171 86
Bank of Tracy, Tracy	981 58	1,028 02
Westside Bank, Tracy	879 78	929 72
Savings Bank of Tulare, Tulare	325 08	335 90
Commercial Bank, Turlock	1,807 82	1,937 32
People's State Bank, Turlock	628 42	608 76
Bank of Ukiah, Ukiah	2,135 92	2,119 56

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*Shown by cities in alphabetical order.

SCHEDULE Q—Concluded.

STATE BANKS.*

State Taxes Levied Against Domestic Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Commercial Bank, Ukiah	$912 80	$885 32
Savings Bank of Mendocino County, Ukiah	714 38	657 32
Citizens Savings Bank, Upland	372 30	397 84
Bank of Vacaville, Vacaville	1,578 12	1,381 38
Vacaville Savings Bank, Vacaville	351 32	307 24
First Savings Bank, Vallejo	636 62	667 62
Vallejo Commercial Bank, Vallejo	1,565 78	1,833 96
Dairyman's Bank, Valley Ford	1,619 94	1,556 32
Venice Savings Bank, Venice	317 44	315 66
Home Savings Bank, Ventura	662 02	605 76
Ventura Savings Bank, Ventura	1,771 42	1,924 78
Bank of Visalia, Visalia	1,035 00	1,011 22
Citizens Bank, Visalia	584 40	143 14
Producers Savings Bank, Visalia	499 52	511 64
Visalia Savings Bank, Visalia	1,159 90	1,270 78
San Ramon Valley Bank, Walnut Creek	1,019 16	1,049 18
Bank of Alex Brown, Walnut Grove	820 24	900 00
Bank of Wasco, Wasco	337 76	310 42
Bank of Watsonville, Watsonville	2,312 48	2,285 48
Pajaro Valley Savings Bank, Watsonville	1,020 60	921 22
Watsonville Savings Bank, Watsonville	779 04	812 58
Trinity County Bank, Weaverville	402 96	341 82
Farmers Bank of Wheatland, Wheatland	493 40	484 14
Home Savings Bank, Whittier	602 22	649 92
Whittier Savings Bank, Whittier	565 22	570 86
Bank of Williams, Williams	1,699 44	1.667 14
Bank of Willits, Willits	1,159 74	1,121 50
Willits Commercial Bank, Willits	322 74	293 84
Bank of Willows, Willows	6,727 88	6,698 98
Glenn County Savings Bank, Willows	776 12	769 20
Citizens Bank, Winters	1,039 84	1,078 26
Savings Bank of Winters, Winters	424 94	370 68
Bank of Woodland, Woodland	15,503 44	15,150 10
Bank of Yolo, Woodland	5,297 68	3,663 16
Home Savings Bank, Woodland	2,085 24	1,863 86
Yolo County Savings Bank, Woodland	3,074 92	2,985 78
First Savings Bank of Siskiyou County, Yreka	408 28	433 08
Siskiyou County Bank, Yreka	2,876 00	2,958 12
Savings Bank of Sutter County, Yuba City	535 74	461 66
Totals	$1,074,702 18	$1,066,204 48

*Shown by cities in alphabetical order.

SCHEDULE R.

NATIONAL BANKS.*

State Taxes Levied Against National Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Alameda National Bank, Alameda	$1,781 88	$1,781 88
Citizens National Bank, Alameda	1,350 30	1,414 08
First National Bank, Alhambra	1,099 56	956 48
First National Bank, Alturas	1,260 46	1,169 22
Anaheim National Bank, Anaheim	613 18	618 22
First National Bank, Anaheim	1,301 78	1,278 80
First National Bank, Antioch	322 06	318 00
First National Bank, Arcata	600 00	600 00
First National Bank, Artesia	429 10	437 28
First National Bank, Auburn	254 14	264 10
First National Bank, Azusa	921 98	942 42
United States National Bank, Azusa	592 16	598 32
First National Bank, Bakersfield	3,855 10	3,849 62
National Bank of Bakersfield, Bakersfield	1,096 62	1,152 74
First National Bank, Baldwin Park	300 36	270 00
First National Bank, Banning	517 32	536 64
Berkeley National Bank, Berkeley	2,437 56	2 26
First National Bank, Berkeley	4,166 28	4,553 30
First National Bank, Brawley	675 60	744 58
First National Bank, Burbank	331 66	360 98
Calexico National Bank, Calexico	862 30	871 50
First National Bank, Calexico	759 50	766 18
First National Bank, Calipatria	330 00	322 32
Calistoga National Bank, Calistoga	419 28	331 12
Butte County National Bank, Chico	5,765 48	5,401 10
First National Bank, Chico	937 44	958 40
First National Bank, Chino	404 74	404 36
Claremont National Bank, Claremont	300 14	304 12
First National Bank, Claremont	423 48	435 90
First National Bank, Clovis	256 56	254 70
First National Bank, Coachella	330 76	329 06
First National Bank, Coalinga	773 42	785 72
National Bank of Coalinga, Coalinga	611 90	631 00
First National Bank, Colton	1,343 68	1,282 64
Colton National Bank, Colton	642 04	654 72
First National Bank, Colusa	1,007 30	1,021 40
First National Bank, Compton	961 80	882 42
First National Bank, Concord	323 48	352 32
First National Bank, Corcoran	682 22	645 76
Corona National Bank, Corona	357 82	359 38
First National Bank, Corona	836 54	851 48
Covina National Bank, Covina	750 62	779 36
First National Bank, Covina	1,487 36	1,500 94
First National Bank, Crows Landing	333 14	341 78
First National Bank, Cucamonga	609 56	596 62
First National Bank, Delano	516 00	507 70
First National Bank, Dinuba	678 40	671 42
United States National Bank, Dinuba	304 54	306 40
First National Bank, Dixon	574 80	559 80
First National Bank, Ducor	217 90	278 30
El Centro National Bank, El Centro	554 64	515 88
First National Bank, El Centro	720 86	1,588 74
First National Bank, El Monte	663 10	649 74
First National Bank, Emeryville	122 12	123 70
Escondido National Bank, Escondido	910 20	913 76
First National Bank, Escondido	683 16	709 24
First National Bank, Eureka	4,282 96	4,295 48
Humboldt National Bank, Eureka	3,273 84	3,243 22
Citrus National Bank, Exeter	301 52	------------
First National Bank, Exeter	555 00	555 00
First National Bank, Fort Bragg	746 96	719 34
First National Bank, Fowler	577 40	624 90
Farmers National Bank, Fresno	7,336 40	7,533 54
First National Bank, Fresno	11,095 16	11,098 70
Fresno National Bank, Fresno	6,311 90	6,522 28

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*Arranged by cities in alphabetical order.

SCHEDULE R—Continued.

NATIONAL BANKS.*

State Taxes Levied Against National Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Union National Bank, Fresno	$3,299 16	$2,516 12
Farmers and Merchants National Bank, Fullerton	494 46	470 82
First National Bank, Fullerton	1,008 16	999 72
First National Bank, Gardena	674 20	723 84
First National Bank, Gilroy	888 96	1,022 46
First National Bank, Glendale	674 80	701 70
First National Bank, Glendora	372 52	384 66
Farmers and Merchants National Bank, Hanford	2,101 46	2,052 26
First National Bank, Hanford	3,581 40	3,307 26
Hanford National Bank, Hanford	1,503 76	1,559 74
First National Bank, Hardwick	339 14	355 00
First National Bank, Hayward	482 84	474 90
First National Bank, Healdsburg	1,891 70	1,887 78
Healdsburg National Bank, Healdsburg	884 62	888 18
First National Bank, Heber	317 14	342 80
First National Bank, Hemet		390 34
First National Bank, Hollister	1,734 46	1,800 58
First National Bank, Hollywood	476 68	516 76
Hollywood National Bank, Hollywood	559 40	929 06
First National Bank, Holtville	1,039 86	1,205 28
First National Bank, Huntington Beach	440 08	455 58
First National Bank, Hynes	318 36	321 54
First National Bank, Imperial	1,130 14	1,242 22
First National Bank, Inglewood	825 02	823 12
Jamestown National Bank, Jamestown	314 46	313 96
First National Bank, Kerman	525 84	454 20
First National Bank, Kingsburg	571 38	568 94
First National Bank, Laton	436 38	434 80
First National Bank, Lemoore	667 72	702 64
First National Bank, Lindsay	837 12	879 48
Lindsay National Bank, Lindsay	681 60	1,491 04
Farmers and Merchants National Bank, Livermore	677 08	679 66
First National Bank, Livermore	915 46	900 46
First National Bank, Lodi	1,374 68	1,353 10
City National Bank, Long Beach	1,373 74	1,305 52
Exchange National Bank, Long Beach	1,922 46	1,910 06
First National Bank, Long Beach	3,428 34	3,353 88
National Bank of Long Beach, Long Beach	3,445 60	3,664 16
First National Bank, Lordsburg	338 52	348 96
Citizens National Bank, Los Angeles	27,135 02	26,963 14
Commercial National Bank, Los Angeles	5,455 88	5,498 04
Continental National Bank, Los Angeles	3,285 86	4,500 00
Farmers and Merchants National Bank, Los Angeles	40,827 40	41,303 56
First National Bank, Los Angeles	48,773 26	49,166 80
Merchants National Bank, Los Angeles	19,181 06	18,644 60
National Bank of California, Los Angeles	8,392 42	8,474 22
Security National Bank, Los Angeles	6,538 52	6,789 96
United States National Bank, Los Angeles	3,647 10	3,614 64
First National Bank, Los Banos	458 92	523 82
First National Bank, Los Gatos	306 00	304 10
Commercial National Bank, Madera	950 00	904 24
First National Bank, Madera	711 84	763 00
First National Bank, Maricopa	346 12	
First National Bank of Contra Costa County, Martinez	648 02	644 96
McCloud National Bank, McCloud	901 78	901 70
First National Bank, McFarland	337 42	346 30
Farmers and Merchants National Bank, Merced	1,320 00	1,320 00
First National Bank, Merced	1,598 52	1,609 86
First National Bank, Modesto	3,136 84	3,132 66
American National Bank, Monrovia	714 60	
First National Bank, Monrovia	1,674 08	1,612 74
National Bank of Monrovia, Monrovia		396 90
First National Bank, Monterey	604 58	633 20
First National Bank, Mountain View	245 46	252 22
First National Bank, Napa	1,248 98	1,247 40

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*Arranged by cities in alphabetical order.

SCHEDULE R—Continued.

NATIONAL BANKS.*

State Taxes Levied Against National Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
People's National Bank, National City	$300 84	$300 84
First National Bank, Newman	691 32	725 40
First National Bank, Newport Beach	312 60	315 02
First National Bank, Oakdale	1,341 56	1,354 72
Central National Bank, Oakland	19,577 70	20,724 66
First National Bank, Oakland	6,127 28	6,045 62
First National Bank, Ocean Park	465 62	464 10
First National Bank, Oceanside	356 14	339 54
First National Bank, Ontario	1,317 96	1,365 84
Ontario National Bank, Ontario	582 98	578 30
First National Bank, Orange	795 91	815 04
National Bank of Orange, Orange	1,848 08	1,911 08
First National Bank, Orland	423 00	422 40
National Bank, The, Orosi	320 20	328 12
First National Bank, Oroville	1,015 14	1,049 04
Rideout-Smith National Bank, Oroville	3,911 80	3,944 08
First National Bank, Oxnard	3,747 66	3,912 04
First National Bank, Palo Alto	596 74	612 66
First National Bank, Parlier	377 84	410 24
First National Bank, Pasadena	4,138 88	4,088 64
National Bank of Pasadena, Pasadena	3,301 78	3,272 96
Security National Bank, Pasadena	1,282 36	1,365 62
Union National Bank, Pasadena	2,462 22	2,486 48
First National Bank, Paso Robles	365 40	396 76
Petaluma National Bank, Petaluma	2,639 50	2,698 22
Sonoma County National Bank, Petaluma	6,661 12	6,502 38
Placentia National Bank, Placentia	398 90	411 96
First National Bank, Pleasanton	307 10	308 34
American National Bank, Pomona	1,332 00	1,362 50
First National Bank, Pomona	3,932 90	4,069 24
First National Bank, Porterville	2,419 74	2,445 90
First National Bank, Puente	427 94	443 64
Red Bluff National Bank, Red Bluff	1,198 16	1,221 34
Northern California National Bank, Redding	1,353 50	1,294 40
Redding National Bank, Redding	1,211 74	1,220 60
Citizens National Bank, Redlands	3,865 08	925 12
First National Bank, Redlands	3,334 20	4,200 00
Redlands National Bank, Redlands	3,974 40	4,282 92
Farmers and Merchants National Bank, Redondo Beach	699 32	589 92
First National Bank, Redondo Beach	424 08	378 86
First National Bank of San Mateo County, Redwood City	3,751 46	3,846 38
First National Bank, Reedley	567 18	576 92
Reedley National Bank, Reedley	571 92	621 54
First National Bank, Rialto	581 40	631 58
First National Bank, Richmond	1,254 98	1,269 02
First National Bank, Rio Vista	----------	300 00
First National Bank, Riverbank	335 28	340 04
First National Bank, Riverdale	322 06	343 44
Citizens National Bank, Riverside	3,919 32	3,961 98
First National Bank, Riverside	4,145 72	4,262 88
National Bank of Riverside, Riverside	1,434 06	1,447 32
California National Bank, Sacramento	13,608 18	13,516 32
Capital National Bank, Sacramento	2,167 60	3,566 20
Fort Sutter National Bank, Sacramento	3,134 40	3,143 84
National Bank of D. O. Mills, Sacramento	15,007 10	15,220 44
Carver National Bank, St. Helena	726 52	724 66
First National Bank, Salinas	2,147 66	2,213 12
Farmers Exchange National Bank, San Bernardino	1,679 90	1,475 90
San Bernardino National Bank, San Bernardino	4,872 04	4,818 70
American National Bank, San Diego	4,161 24	3,874 52
First National Bank, San Diego	4,799 72	3,887 94
Marine National Bank, San Diego	1,114 78	1,295 64
Merchants National Bank, San Diego	7,887 52	8,368 68

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*Arranged by cities in alphabetical order.

SCHEDULE R—Continued.

NATIONAL BANKS.*

State Taxes Levied Against National Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
Union National Bank, San Diego	$2,891 68	$2,892 36
United States National Bank, San Diego	927 44	1,359 94
First National Bank, San Dimas	861 42	760 26
First National Bank, San Fernando	286 20	275 34
San Fernando National Bank, San Fernando	379 50	436 92
American National Bank, San Francisco	17,603 02	17,287 26
Anglo and London Paris National Bank, San Francisco	68,794 38	70,949 06
Bank of California National Association, San Francisco	189,303 04	189,827 04
Crocker National Bank, San Francisco	61,010 58	63,458 76
First National Bank, San Francisco	58,271 74	58,304 56
Mercantile National Bank, San Francisco	37,388 40	36,467 52
Merchants National Bank, San Francisco	15,193 04	15,166 46
Seaboard National Bank, San Francisco	8,081 26	8,303 26
Wells-Fargo Nevada National Bank, San Francisco	124,546 26	128,271 16
First National Bank, Sanger	855 72	914 74
First National Bank, San Jacinto	1,608 26	1,555 64
First National Bank, San Jose	4,943 88	4,739 54
First National Bank, San Leandro	836 66	682 88
Union National Bank, San Luis Obispo	1,069 68	1,080 12
National Bank of San Mateo, San Mateo	698 52	716 32
First National Bank, San Pedro	700 58	686 48
Marin County National Bank, San Rafael	747 24	748 90
California National Bank, Santa Ana	1,521 70	1,491 14
Farmers and Merchants National Bank, Santa Ana	3,211 76	3,627 34
First National Bank, Santa Ana	7,162 48	7,102 52
First National Bank, Santa Barbara	2,421 70	2,372 40
Santa Barbara County National Bank, Santa Barbara	2,397 46	2,419 20
Farmers and Merchants National Bank, Santa Cruz	1,263 60	1,293 20
First National Bank, Santa Cruz	2,060 18	2,089 88
Santa Cruz County National Bank, Santa Cruz	2,763 38	2,753 94
First National Bank, Santa Maria	1,086 00	1,086 60
Merchants National Bank, Santa Monica	607 84	576 42
First National Bank, Santa Paula	2,527 64	2,619 36
Santa Rosa National Bank, Santa Rosa	2,256 16	2,171 58
First National Bank, Scotia	420 30	459 60
First National Bank, Sebastopol	1,152 38	1,186 60
First National Bank, Seeley	308 20	314 04
First National Bank, Selma	2,320 92	1,821 10
Selma National Bank, Selma	574 52	604 78
First National Bank, Sierra Madre	397 84	330 86
First National Bank, Sonoma	332 66	337 26
First National Bank, Sonora	1,681 20	1,328 50
Sonora National Bank, Sonora	892 48	853 80
First National Bank, South Pasadena	355 62	362 12
First National Bank, Stockton	6,491 86	6,611 36
San Joaquin Valley National Bank, Stockton	---------------	6,615 48
First National Bank, Suisun	1,355 54	1,227 46
First National Bank, Taft	339 08	---------------
First National Bank, Temecula	305 04	260 42
First National Bank, Terra Bella	277 18	299 00
First National Bank, Torrance	380 66	427 58
First National Bank, Tropico	395 18	402 20
First National Bank, Tulare	1,581 10	1,593 54
National Bank of Tulare, Tulare	1,402 56	1,384 08
First National Bank, Tustin	704 48	720 00
Commercial National Bank, Upland	782 34	771 88
First National Bank, Upland	392 10	400 38
First National Bank, Vacaville	468 84	509 64
First National Bank, Vallejo	1,588 74	1,323 10
First National Bank, Van Nuys	633 02	645 20
First National Bank, Venice	641 46	628 72
First National Bank, Ventura	2,329 46	2,314 68
National Bank of Ventura, Ventura	5,245 98	5,500 10
First National Bank, Visalia	2,122 20	2,074 04

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*Arranged by cities in alphabetical order.

SCHEDULE R—Concluded.

NATIONAL BANKS.*

State Taxes Levied Against National Banks for the Years 1915 and 1916.

Name of bank and location	Tax, 1915	Tax, 1916
National Bank of Visalia, Visalia	$3,964 68	$4,068 64
First National Bank, Walnut Creek	337 36	321 72
Pajaro Valley National Bank, Watsonville	2,936 76	2,540 46
First National Bank, Weed	435 66	458 00
First National Bank, Whittier	1,557 30	1,576 42
Whittier National Bank, Whittier	1,730 70	1,723 92
First National Bank, Willows	1,039 88	1,058 10
First National Bank, Wilmington	291 16	287 10
First National Bank, Winters	986 48	912 94
First National Bank, Woodlake	312 68	304 78
First National Bank, Woodland	1,612 86	1,905 52
First National Bank, Yreka	--------------	599 26
First National Bank, Yuba City	1,216 14	1,234 30
Totals	$1,153,442 56	$1,169,719 38

*Arranged by cities in alphabetical order.

SCHEDULE S.

INSURANCE COMPANIES.

State Taxes Levied Against Insurance Companies for the Years 1915 and 1916.

	Tax, 1915	Tax, 1916
Aachen and Munich Fire Insurance Company	$40 26	$36 58
Ætna Accident and Liability Company	1,428 62	2,116 34
Ætna Insurance Company	17,952 24	18,890 82
Ætna Life Insurance Company	22,707 76	23,326 32
Agricultural Insurance Company	2,519 10	2,432 36
Alliance Assurance Company	----------	90 64
Alliance Insurance Company	2,104 81	2,054 30
Allianz Insurance Company, Ltd.	642 38	672 48
American and Foreign Marine Insurance Company	367 32	549 74
American Automobile Insurance Company	655 94	827 26
American Casualty Company	384 26	93 10
American Central Insurance Company	1,391 92	1,697 76
American Credit Indemnity Company	608 74	560 90
American Druggists Fire Insurance Company	192 60	223 76
American Eagle Fire Insurance Company	----------	90 92
American Exchange Underwriters	111 76	112 60
American Indemnity Exchange	----------	80 76
American Insurance Company	2,047 88	2,617 98
American National Assurance Company	228 98	197 08
American National Insurance Company	405 96	654 60
American Surety Company of New York	2,444 90	1,664 80
Amicable Life Insurance Company	----------	10 38
Arizona Fire Insurance Company	147 80	247 70
Atlantic Mutual Insurance Company	67 36	68 44
Atlas Assurance Company	3,927 34	3,926 42
At Underwriters Exchange	443 58	443 10
Austin Fire Insurance Company	350 52	275 42
Automobile Insurance Company	10 62	678 76
Bankers Life Company	10,391 16	10,799 28
Beneficial Life Insurance Company	92 46	125 06
Boston Insurance Company	3,192 30	4,140 48
British American Assurance Company	628 30	1,142 50
British and Foreign Marine Insurance Company, Ltd.	2,271 40	2,254 38
Business Men's Accident Association of America	----------	36 76
Butte County Farmers Mutual Fire Insurance Company	2 58	36 14
Caledonian American Insurance Company	75 42	88 64
Caledonian Insurance Company	3,110 18	3,167 52
California Casualty Company	----------	1,292 96
California Insurance Company	4,373 86	3,614 16
California Casualty Indemnity Exchange	570 18	699 34
California Pacific Title Insurance Company	1,269 88	1,293 82
California State Automobile Association Inter-Insurance Bureau	178 16	----------
California State Life Insurance Company	8,597 40	10,101 76
Camden Fire Insurance Company	1,438 92	1,089 22
Canton Insurance Office, Ltd.	2,456 74	2,742 94
Capital Fire Insurance Company of California	695 42	268 92
Casualty Company of America	680 94	2,579 34
Casualty Reciprocal Exchange	663 50	677 82
Central Manufacturers Mutual Insurance Company	288 46	430 84
Century Insurance Company, Ltd.	407 32	261 08
Chicago Bonding and Surety Company	355 88	128 94
Citizens Insurance Company of Missouri	1,201 20	1,152 12
City Abstract and Title Insurance Company	254 82	223 50
City of New York Insurance Company	1,060 84	1,116 70
Columbia Insurance Company	19 12	91 52
Columbia Life and Trust Company	413 58	216 44
Columbian National Fire Insurance Company	602 06	986 30
Columbian National Life Insurance Company	1,781 68	1,797 50
Commercial Union Assurance Company, Ltd.	6,650 40	6,383 70
Commercial Union Fire Insurance Company	377 32	354 18
Commonwealth Bonding and Casualty Company	4,053 92	----------
Commonwealth Fire Insurance Company	350 52	275 44
Commonwealth Insurance Company of New York	571 44	536 22
Concordia Fire Insurance Company	718 96	781 40
Connecticut Fire Insurance Company	5,106 14	4,548 46
Connecticut General Life Insurance Company	288 18	382 80
Connecticut Mutual Life Insurance Company	4,962 52	5,095 38
Continental Casualty Company	2,488 12	2,120 74

SCHEDULE S—Continued.

INSURANCE COMPANIES.

State Taxes Levied Against Insurance Companies for the Years 1915 and 1916.

	Tax, 1915	Tax, 1916
Continental Insurance Company	$9,598 82	$10,436 98
Continental Life Insurance and Investment Company	723 88	893 86
County Fire Insurance Company of Philadelphia	----------	32 50
Detroit Fire and Marine Insurance Company	751 72	838 90
Detroit National Fire Insurance Company	----------	52 00
Dubuque Fire and Marine Insurance Company	1,853 68	2,119 24
Employers Indemnity Corporation	----------	101 12
Employers Indemnity Exchange	266 86	1,695 12
Employers Liability Assurance Corporation, Ltd.	8,066 46	6,792 58
Equitable Fire and Marine Insurance Company	392 54	773 14
Equitable Life Assurance Society of United States	40,808 40	42,643 98
Equitable Surety Company	259 60	130 76
Farmers Mutual Fire Insurance Company (Fort Bragg)	10 72	13 66
Farmers Mutual Fire Insurance Company (Turlock)	176 14	89 92
Farmers Mutual Fire Insurance Company (Woodland)	100 90	91 52
Farmers Mutual Protective Fire Insurance Company (Stockton)	146 34	280 36
Federal Casualty Company	181 66	174 36
Federal Insurance Company	1,157 12	1,586 42
Fidelity and Casualty Company	10,999 20	8,589 22
Fidelity and Deposit Company of Maryland	14.385 40	11,086 34
Fidelity Mutual Life Insurance Company	3,895 62	4,123 20
Fidelity Phenix Fire Insurance Company	5,160 08	6,223 88
Fire Association of Philadelphia	3,998 24	3,976 90
Fireman's Fund Insurance Company	18,595 16	19,942 78
Firemen's Insurance Company	2,689 58	2,841 18
First National Fire Insurance Company of United States	392 40	307 70
Fitchburg Mutual Fire Insurance Company	55 22	75 88
Fonciere Transports Insurance Company	511 34	701 90
Frankfort General Insurance Company	4,331 52	2,501 10
Franklin Fire Insurance Company	1,386 56	1,185 18
General Accident, Fire and Life Assurance Corporation, Ltd.	727 20	443 82
General Indemnity Corporation of America	7 84	56 08
General Marine Insurance Company of Dresden	110 22	70 72
Georgia Casualty Company	----------	1,280 08
German Alliance Insurance Company	562 30	547 24
German American Insurance Company (New York)	8,265 88	9,550 90
German American Insurance Company of Pennsylvania	228 50	238 02
German Fire Insurance Company (Illinois)	591 56	302 60
German Fire Insurance Company (Pennsylvania)	311 02	----------
Germania Fire Insurance Company	756 42	926 98
Germania Life Insurance Company	4,043 76	4,001 26
Girard Fire and Marine Insurance Company	1,225 88	572 60
Glens Falls Insurance Company	1,691 52	1,475 66
Globe and Rutgers Fire Insurance Company	3,592 00	3,615 24
Globe Indemnity Company of New York	6,289 96	4,867 18
Great Eastern Casualty Company	654 46	745 86
Great Republic Life Insurance Company	2,889 02	2 996 42
Great Southern Fire Insurance Company	50 64	----------
Great Western Accident Association	83 06	70 60
Guarantee Fund Life Association	982 48	1,095 78
Guardian Casualty and Guaranty Company	6,347 50	7,404 70
Hamburg Bremen Fire Insurance Company	339 42	163 94
Hamilton Fire Insurance Company	148 68	109 34
Hanover Fire Insurance Company	1,400 54	1,281 34
Hardware Merchants Inter-Insurers	87 16	----------
Hartford Accident and Indemnity Company	489 44	3,744 72
Hartford Fire Insurance Company	16,596 72	17,553 16
Hartford Steam Boiler Inspection and Insurance Company	798 14	778 32
Hilmar Mutual Fire Insurance Company	47 44	12 22
Home Fire Insurance Company of Utah	573 46	579 46
Home Insurance Company of New York	18,558 54	19,779 36
Home Life Insurance Company	3,409 52	3,389 20
Humboldt County Fire Insurance Company	42 92	49 54
Humboldt Fire Insurance Company of Pittsburg	927 94	1,021 10
Illinois Surety Company	201 48	122 98
Imperial Assurance Company	532 20	543 50
Indemnity Mutual Marine Assurance Company, Ltd.	239 86	285 00
Indiana and Ohio Live Stock Insurance Company	131 56	43 40

SCHEDULE S—Continued.

INSURANCE COMPANIES.

State Taxes Levied Against Insurance Companies for the Years 1915 and 1916.

	Tax, 1915	Tax, 1916
Indiana Lumbermen's Mutual Insurance Company	$142 86	$254 74
Individual Underwriters	249 26	195 38
Insurance Company of North America	8,998 68	9,681 50
Insurance Company of State of Pennsylvania	1,573 48	2,026 68
International Fire Insurance Company	172 46	233 52
International Indemnity Exchange	74 20	655 56
International Life Insurance Company	797 68	624 88
Inter-Insurance Exchange of Automobile Club of Southern California	2,820 78	2,850 98
Inter-Ocean Life and Casualty Company	102 56	122 22
Inter-State Business Men's Accident Association	274 64	258 72
Lake County Farmers Mutual Fire Insurance Company	12 12	6 10
Law Union and Rock Insurance Company	1,393 32	1,138 14
Liverpool and London and Globe Insurance Company of New York	96 24	316 90
Liverpool and London and Globe Insurance Company	8,175 12	8,430 24
Lloyds Plate Glass Insurance Company	248 32	237 24
London and Lancashire Fire Insurance Company	5,730 06	6,230 08
London and Lancashire Guarantee and Accident Company of Canada	4,338 80	1,008 66
London and Lancashire Indemnity Company of America	--------------	2,312 48
London Assurance Corporation	8,578 84	8,943 84
London Guarantee and Accident Company	6,548 80	5,819 74
Los Angeles County Mutual Fire Association	377 04	381 26
Los Angeles Title Insurance Company	2,100 20	2,132 86
Los Angeles Title and Trust Company	304 42	--------------
Loyal Protective Insurance Company	146 38	127 88
Lumber Insurance Company of New York	363 94	--------------
Lumber Manufacturers Inter-Insurance Association	31 82	86 36
Lumbermen's Indemnity Exchange	449 42	431 14
Lumber Mutual Fire Insurance Company	193 36	186 98
Lumbermen's Mutual Insurance Company	295 22	316 62
Manhattan Life Insurance Company	1,447 30	1,239 86
Mannheim Insurance Company	1,753 84	2,244 56
Marine Insurance Company, Ltd. (London)	257 14	172 54
Maritime Insurance Company, Ltd.	1,054 94	1,125 82
Maryland Casualty Company	7,404 08	8,522 96
Maryland Motor Car Insurance Company	76 28	119 30
Masonic Mutual Accident Company	81 30	70 04
Masonic Protective Association	228 98	202 72
Massachusetts Bonding and Insurance Company	3,770 30	3,600 06
Massachusetts Fire and Marine Insurance Company	355 64	1,011 28
Massachusetts Mutual Life Insurance Company	4,421 08	4,799 26
Mechanics and Traders Insurance Company	946 56	818 12
Medical Protective Company	461 28	587 24
Merchants Fire Assurance Corporation of New York	820 96	899 08
Merchants Fire Insurance Company	248 12	442 94
Merchants Life Association	142 12	152 20
Metropolitan Casualty Insurance Company of New York	400 76	371 30
Metropolitan Life Insurance Company	49,332 36	54,088 24
Michigan Commercial Insurance Company	685 30	741 16
Michigan Fire and Marine Insurance Company	1,692 02	1,631 02
Midland Casualty Company	247 30	--------------
Minneapolis Fire and Marine Insurance Company	--------------	74 16
Missouri State Life Insurance Company	1,250 04	1,247 14
Mortgage Guarantee Company	125 38	279 98
Mutual Benefit Life Insurance Company	14,514 70	15,239 78
Mutual Life Insurance Company of New York	32,787 80	33,050 62
Napa County Farmers Mutual Fire Insurance Company	23 16	90 58
National Ben Franklin Fire Insurance Company	2.593 26	2,688 50
National Casualty Company	597 52	594 22
National Fire Insurance Company	8,624 26	8,374 64
National Life Association	153 60	195 76
National Life Insurance Company	3,783 38	3,948 42
National Life Insurance Company of U. S. A.	2,185 42	2,869 28
National Lumber Insurance Company	114 20	--------------
National Surety Company	3,313 06	3,102 84
National Union Fire Insurance Company	7,222 90	7,033 34
Netherlands Fire and Life Insurance Company	1,451 42	1,700 46
New Amsterdam Casualty Company	2,806 60	3,005 94
Newark Fire Insurance Company	946 42	1.073 94

SCHEDULE S—Continued.

INSURANCE COMPANIES.

State Taxes Levied Against Insurance Companies for the Years 1915 and 1916.

	Tax, 1915	Tax, 1916
New Brunswick Fire Insurance Company	$1,298 14	$1,677 48
New England Casualty Company	1,935 56	1,769 46
New England Mutual Life Insurance Company	8,098 74	8,145 30
New Hampshire Fire Insurance Company	2,000 00	2,019 16
New Jersey Fidelity and Plate Glass Insurance Company	197 52	175 24
New Jersey Fire Insurance Company	1,729 52	471 42
New World Life Insurance Company	174 44	375 66
New York Life Insurance Company	57,377 24	61,975 60
New York Plate Glass Insurance Company	360 62	364 98
New York Reciprocal Underwriters	769 94	734 90
New Zealand Insurance Company	3,216 28	3,237 26
Niagara Fire Insurance Company	5,703 64	5,489 00
Nord Deutsche Insurance Company	904 52	1,766 42
North American Accident Insurance Company	1,304 80	1,293 96
North British and Mercantile Insurance Company	7,247 56	7,242 24
North China Insurance Company	712 70	951 42
Northern Assurance Company	6,276 62	5,891 60
Northern Insurance Company of New York	389 94	551 60
North River Insurance Company	2,631 26	2,951 14
Northwestern Fire and Marine Insurance Company	314 74	602 98
Northwestern Mutual Fire Association	3,092 50	2,520 12
Northwestern Mutual Life Insurance Company	24,069 24	26,378 54
Northwestern National Insurance Company	4,161 26	5,040 14
Northwestern National Life Insurance Company	409 40	506 28
Norwich Union Fire Insurance Society	3,345 72	3,839 14
Oakland Title Insurance and Guaranty Company	86 72	118 04
Occidental Fire Insurance Company	209 44	159 52
Occidental Life Insurance Company	10,231 08	9,153 32
Ocean Accident and Guarantee Corporation, Ltd.	1,161 08	2,578 28
Ocean Marine Insurance Company, Ltd.	475 68	436 74
Old Colony Insurance Company	335 98	261 62
Orange County Farmers Mutual Fire Insurance Company	205 42	292 82
Oregon Fire Relief Company	19 52	40 28
Orient Insurance Company of Hartford	1,882 10	2,126 98
Pacific Automobile Indemnity Exchange	1,726 76	2,848 62
Pacific Coast Casualty Company	6,785 74	8,554 14
Pacific Fire Insurance Company	646 44	826 76
Pacific Mutual Life Insurance Company	30,771 74	31,014 40
Pacific National Fire Insurance Company	--------------	250 12
Pacific Surety Company	367 94	--------------
Palatine Insurance Company, Ltd.	2,478 24	2,364 32
Patrons Mutual Fire Association of Tulare	88 30	39 34
Penn Mutual Life Insurance Company	18,088 46	18,972 22
Pennsylvania Fire Insurance Company	4,500 78	4,453 68
Pennsylvania Lumbermen's Mutual Fire Insurance Company	176 28	154 66
People's National Fire Insurance Company	609 88	644 32
Philadelphia Life Insurance Company	554 54	588 68
Phœnix Assurance Company, Ltd.	7,747 76	8,647 00
Phœnix Insurance Company of Hartford	6,275 30	6,364 34
Phœnix Mutual Life Insurance Company	5,033 54	4,913 26
Pittsburg Life and Trust Company	1,635 96	1,399 74
Preferred Accident Insurance Company	1,262 22	1,404 72
Property Underwriters Association	894 44	--------------
Providence Washington Insurance Company	3,582 70	3,615 48
Provident Life and Trust Company	7,785 54	7,956 28
Prudential Casualty Company	3 00	--------------
Prudential Insurance Company of America	23,381 90	27,196 98
Prussian National Insurance Company	3,118 24	3,909 94
Queen Insurance Company of America	6,463 76	6,844 66
Reliance Insurance Company	890 12	868 96
Reliance Life Insurance Company	1,450 96	1,767 46
Reliance Marine Insurance Company	114 70	97 44
Rhode Island Insurance Company	440 04	691 92
Ridgeley Protective Association	381 28	369 46
Royal Indemnity Company	9,430 21	9,375 48
Royal Insurance Company	8,137 84	8,034 64
Sacramento County Patrons and Farmers Mutual Fire Insurance Co.	49 98	68 26
Safeguard Insurance Company of New York	--------------	6 38

SCHEDULE S—Concluded.

INSURANCE COMPANIES.

State Taxes Levied Against Insurance Companies for the Years 1915 and 1916.

	Tax, 1915	Tax, 1916
San Bernardino County Mutual Fire Insurance Company	$200 84	$231 46
San Diego County Mutual Fire Insurance Company	5 32	6 04
San Francisco Life Insurance Company	5,388 64	----------
Santa Barbara County Farmers Mutual Fire Association	46 24	105 62
Santa Clara County Fire Insurance Company	70 64	84 12
Scandinavian Mutual Protective Fire Insurance Association	616 98	376 82
Scottish Union and National Insurance Company	3,395 34	3,271 56
Scranton Life Insurance Company	489 94	502 16
Sea Insurance Company, Ltd.	1,171 30	1,419 00
Security Insurance Company	1,972 90	1,[illegible]02 90
Security Life Insurance Company	362 82	400 84
Sonoma County Farmers Mutual Fire Insurance Company	194 42	225 30
Southwestern Surety Insurance Company	7,340 46	4,546 02
Springfield Fire and Marine Insurance Company	6,816 88	6,863 88
Standard Fire Insurance Company	574 16	568 80
Standard Life and Accident Insurance Company	1,790 36	2,827 96
Standard Life Insurance Company	74 08	----------
Standard Marine Insurance Company, Ltd.	2,060 68	2,884 06
Standard Title Insurance Company	593 02	----------
State Assurance Company	370 54	335 26
State Life Insurance Company	3,506 08	2,991 16
Sterling Fire Insurance Company	530 82	347 78
St Paul Fire and Marine Insurance Company	5,705 00	6,178 20
Stuyvesant Insurance Company of New York	1,037 12	577 42
Subscribers at United States Lloyds	813 62	1,113 38
Sun Insurance Office of London	5,226 24	4,931 14
Surety Company of California	----------	147 42
Svea Fire and Life Insurance Company	2,279 86	2,371 54
Switzerland General Insurance Company, Ltd.	3,687 64	3,998 92
Thames and Mersey Marine Insurance Company	1,244 34	2,007 84
Title Guarantee and Trust Company	4,375 12	4,671 60
Title Insurance Guaranty Company	787 14	880 18
Title Insurance and Trust Company	6,649 84	6,034 84
Travelers Insurance Company	15,773 42	16,545 54
Union Assurance Society, Ltd.	2,777 74	2,290 24
Union Central Life Insurance Company	9,301 58	9,457 92
Union Fire Insurance Company	----------	110 16
Union Marine Insurance Company	2,261 56	2,373 06
Union Mutual Life Insurance Company	3,225 00	3,391 68
United Fireman's Insurance Company	841 68	111 92
United Protective Life Association	161 54	----------
United Sick and Health Company	----------	325 72
United States Casualty Company	1,155 94	1,495 84
United States Fidelity and Guaranty Company	12,680 76	12,371 38
United States Fire Insurance Company	1,002 94	899 26
United States Health and Accident Insurance Company	129 72	----------
Urbaine Fire Insurance Company	----------	158 28
Ventura County Mutual Fire Insurance Company	230 12	246 00
Vulcan Fire Insurance Company	970 52	1,143 72
Warner's Inter-Insurance Bureau	587 56	841 88
Westchester Fire Insurance Company	2,365 30	2,308 16
West Coast Life Insurance Company	10,205 56	----------
West Coast San Francisco Life Insurance Company	----------	15,466 72
Western Assurance Company	3,420 64	3,472 12
Western Indemnity Company	3,705 70	5,449 06
Western Life and Accident Company	453 66	857 74
Western Mortgage and Guaranty Company	503 36	255 70
Western States Life Insurance Company	7,648 58	9,544 20
Westside Mutual Fire Insurance Company	3 26	1 12
Williamsburgh City Fire Insurance Company	2,309 44	4,136 52
Yang-tsze Insurance Association, Ltd.	1,556 92	1,621 18
Yorkshire Insurance Company	1,315 78	1,673 08
Totals	$1,022,455 96	$1,065,272 32

SPECIAL REPORT ON RELATIVE TAX BURDEN

1913-1915

SPECIAL REPORT ON RELATIVE TAX BURDEN.

To His Excellency, HIRAM W. JOHNSON,
Governor.

DEAR SIR: In compliance with your request we have made an investigation directed to ascertain whether the public utilities are now paying taxes at the same rate as property taxed for local purposes in this state.

The findings are that property taxed for local purposes is now bearing a tax burden equal to 1.2183 per cent of its true value. The effect of the changes made by the legislature in 1913 are shown in the following table:

Class	Tax rates per cent		Increase		Ratios to commercial value—	
	1910	1913	Absolute	Per cent	Of 1910 rate	Of 1913 rate
Railroads	4	4.75	.75	18¾	.9092	1.1021
Gas and electric	4	4.6	.6	15	.75	.8763
Telephone and telegraph	3½	4.2	.7	20	.9060	1.1245
Car companies	3	4	1.0	33⅓	.8813	1.2587
Express	2	2	.0	0	1.5413	1.5413

Save in one particular, the gas and electric companies, these figures are fairly representative, but for the reasons explained on page 19 of the special report of the State Board of Equalization of 1912, the figures are in that one case subject to modification.

Since it was obviously impossible under the present conditions of business to make an appraisement of general property values, or to ascertain the stock and bond shares of public utilities in the manner in which these things were done in 1912, some new method had to be devised for arriving at the facts needed, and in particular to answer the question whether the general burden of taxation upon real estate of the state has increased and by how much.

The method adopted was to assume that the investigation of 1912 as made by the State Board of Equalization was a satisfactory starting point, and to inquire into the changes which have taken place since then. In one particular, however, the basis of 1912 was departed from; this in the nature of a correction of the results of the appraisement of property in Los Angeles County. In effect, it reduced the basic rate of taxes to true value, from 1.1386 per cent to 1.102 per cent.

The facts available bearing upon the problem presented are:

(1) The county and the city assessment rolls.
(2) The county and city taxes for the years 1912 and 1914.

These are set forth in detail in table accompanying this communication.

In drawing conclusions from these figures, we have had to make a number of adjustments, so that the comparison shall be between the same cities in each of the two years, and a number of minor corrections and adjustments.

The assumption upon which we have proceeded is that if the taxes levied have increased faster than the assessed value of the property has increased, the burden of taxation has increased, and it is further assumed that the difference in the two rates of increase in percentages will show very closely the actual increase in the tax burden upon the local tax payers.

It appears that the county tax rolls show an increase of 10.15 per cent, county taxes 20 per cent. The city rolls show an increase of 15.29 per cent, the city taxes 22.23 per cent. The difference of the rate of increase in the city over the rate of increase in the county rolls is explained by the known fact that the city rolls are sometimes increased in order to get more taxes without passing the dollar limit on the tax rate, which is often prescribed by city charters. The same property is also assessed by the county assessors, and the latter showed for city property an increase of only 12 per cent. In all these discussions San Francisco is listed as a county and not as a city.

It appears then that the city rolls have been increased at least 3 per cent, if not more, for the purpose of raising more taxes, and this increase is in effect an increase in tax burden. For that reason we have adopted the county rolls as the better basis of computation. The general result may be illustrated as follows:

The total taxes levied in 1912 were	$60,823,342 00
If there had been no increase in tax rates the tax would have increased just as much as the rolls increased, or by 10.15 per cent, and	
Add 10.15 per cent to the above	6,173,569 00
And we have	$66,996,911 00
But the taxes levied in 1914 were	$74,067,499 00

If the average tax rate on true value was as estimated above for 1912, 1.102 per cent, then it follows that as 66,996,911 is to 74,067,499, so is 1.102 to the quantity we are seeking, namely the average tax rate to true value in 1914.

Solving the proportion above we have 1.2183. It would appear, therefore, that the property taxed locally is at the present time paying at the rate of 1.2183 of its true value.

The above figure is confirmed by the results of a number of other computations with the same basic figures along somewhat different lines of arithmetical procedure, so that we are satisfied that it is as nearly correct as it is possible to obtain at this time.

The data and the computation have been checked by tax experts representing the different corporations, and all are agreed as to the substantial accuracy of the figures upon which they are based and of the computation by which the result has been arrived at.

It is our opinion that the railroads and the gas and electric companies are a class of companies so closely analogous from the point of view of the business world, that despite the difference shown by the investigation made in 1912, they should take the same rates, whatever they may be, that are imposed upon the railroad companies. With that modification, the figures show that in order to reach an equivalent with a tax rate of 1.2183, the:

Railroads should be increased from 4¾ per cent to 5¼ per cent;
The gas and electric companies from $4\frac{6}{10}$ per cent to 5¼ per cent;
The telegraph and telephone companies from $4\frac{2}{10}$ per cent to 4½ per cent;
The express companies reduced from 2 per cent to $1\frac{6}{10}$ per cent;
The banks and general franchises increased from 1 per cent to $1\frac{2}{10}$ per cent;
The car companies reduced from 4 per cent to $3\frac{95}{100}$ per cent.

There is no way of establishing an equation between the tax on property in general and the tax paid by the insurance companies based upon their premiums, but if the tax established in 1913 of 1¾ per cent upon insurance companies was in any way equivalent to the burden imposed upon property in general in 1912, they should be raised by approximately 10 per cent, or say to 2 per cent, which is the prevailing rate throughout the United States.

The effect of the foregoing changes would be to increase the revenues of the state from this source by approximately $1,320,000.00, based upon the estimate for the sixty-seventh fiscal year. This is exclusive of the insurance companies, which are difficult to estimate, but which will probably yield $90,000.00 more.

Representatives of some of the companies have admitted the justice of an increase in their taxes at this time, but the banks have advanced a claim that their taxes are already 1.18 per cent. The accuracy of this figure is very dubious, in view of the prevailing undervaluation of bank property as carried on their books, but accurate or not the figure so arrived at has no bearing whatever on the problem in hand.

They obtain this figure by adding to the taxes paid to the state the taxes paid on their real estate locally.

After careful consideration of all that the banks have to say, we are unable to see the propriety of this method of computation.

The constitution itself separates bank property into two classes. One is the real estate, which is to be taxed locally, the other is the excess of stock value over the assessable value of the real estate, which stock value is to be taxed by the state. This creates two absolutely distinct classes of property, and they can not be recombined. Substantially the same segregation is made of the property of the utilities whose ''nonoperative'' property is taxed locally while the ''operative'' property is taxed by the state.

The banks' real estate is assessed and taxed as is other real estate similarly situated. With the effect of such taxes or their amount the state is in no way concerned. But the state is deeply concerned to see to it that the taxes on that part of the property of the banks reserved for state taxation are equal to the other state taxes. Any other view amounts to an amendment of the constitution, which is beyond the power of the legislature.

With reference to the telegraph and telephone companies, it should be pointed out that their taxes were raised more in 1913 than were those of other companies, hence part of the advance has been anticipated. The rate of 4½ per cent brings them to substantial equality with the other companies.

The aggregates of taxes and assessments, and the rates of increase in the various items, are presented in the following table:

Table of Figures Forming Basis of Findings as to Increase in Tax Burden of 1914 over 1912.

	1912	1914
Taxes levied—		
County	$45,038,046 00	$54,615,096 00
City	15,785,296 00	19,452,403 00
	$60,823,342 00	$74,067,499 00
Assessed values—		
County	$2,475,746,905 00	$2,727,061,513 00
City	1,134,378,467 00	1,307,861,311 00
	$3,610,125,372 00	$4,034,922,824 00

Per cent increase 1914 over 1912—County taxes	20.00
Per cent increase 1914 over 1912—County assessment	10.15
Per cent increase 1914 over 1912—City taxes	23.23
Per cent increase 1914 over 1912—City assessment	15.29
County assessed values in municipalities for 1914	$1,166,250,819 00
County assessed values in municipalities for 1912	1,040,710,374 00
Increase of 1914 county assessed values in municipalities over 1912	12%

Respectfully submitted.

Carl C. Plehn,
Clyde L. Seavey.

January 16, 1915.

Bulletin

OF

STATE BOARD OF EQUALIZATION

Proceedings of Fifteenth Annual Convention

of

COUNTY ASSESSORS' ASSOCIATION OF CALIFORNIA

Including Papers read on Tax Law and Administration

WHEREAS, Since our last meeting, death has removed from our roll one of our best loved members in the person of Clarence D. Hayward of San Mateo County; and

WHEREAS, His wise counsel and advice will be missed in the session of this association, as well as his genial spirit in our social affairs; therefore be it

Resolved, That in the death of Clarence D. Hayward, San Mateo County has lost a valuable and respected citizen and this association one of its most worthy and best esteemed members. Be it further

Resolved, That a copy of these resolutions be spread upon the minutes of the association and that when we adjourn we do so out of respect to the memory of our departed associate.

M. D. LACK,
ED J. KAY,
Committee.

PROCEEDINGS OF THE COUNTY ASSESSORS' ASSOCIATION OF CALIFORNIA, IN FIFTEENTH ANNUAL CONVENTION.

Held at El Centro, Imperial County, November 15-16-17, 1916.

The convention was called to order at 10 o'clock a.m. November 15th in the ballroom of the Barbara Worth Hotel at El Centro, California, President John Ginty, assessor of San Francisco County, presiding. A. L. Richmond, president of the Chamber of Commerce of El Centro, then appeared, and on behalf of his city welcomed the association in a way which left no doubt of its wholeheartedness. Thomas M. Robinson, secretary of the convention, being absent on an Eastern trip, M. D. Lack, assessor of Shasta County, was appointed to act in his place, with Archie Taber as assistant.

ROLL CALL.

The secretary called the roll and noted all officers of the association and members present.

MINUTES.

On motion, the reading of the minutes of the proceedings of the fourteenth annual convention held at San Francisco, California, was dispensed with, attention being called to the fact that the full minutes were printed in the "Report of the State Board of Equalization."

RESOLUTIONS.

The president called attention to the fact that since our last meeting we had lost one of our members by death, and appointed a committee, consisting of M. D. Lack and Ed J. Kay, to draft suitable resolutions on the death of Clarence D. Hayward.

REPORTS.

Under the head of "Reports of Officers," President Ginty gave a brief resume of the activities of the association for the past year and made suggestions for its attention in the future.

TREASURER'S REPORT.

Assessor George W. Murray filed his Annual Report which, on motion, was read and approved.

Assessor Ginty of San Francisco presented an able paper outlining a plan of appraisement and classification of lands for taxation and other purposes. His suggestions were discussed by M. M. Moulton, assessor of San Diego County, and Ed J. Kay, assessor of Sacramento County. At the conclusion, Mr. Ginty was requested to further develop his suggestion in the light of the point made in the discussion and to give us the benefit of a more completed form at our next annual meeting.

The association then adjourned to reconvene at 2 p.m.

In the afternoon session, John Mitchell, of the State Board of Equalization, presented a comprehensive report of his visit to the Eastern

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NOTE.—The fourteenth annual convention of the association was held in San Francisco in August, 1915, but as the National Tax Association was held at the same time, no papers were read at the assessors' convention.

States on behalf of his board, as well as his attendance at the National Tax Association meeting in the same capacity. The report was received and filed.

BONDED INDEBTEDNESS.

State Controller John S. Chambers discussed before the association the subject of bonded indebtedness and presented figures to show the enormous increase of bonded indebtedness over a period of the last few years. Mr. Chambers made it plain that he appreciated that bonding to raise money for immediate necessary improvements is advisable, yet he suggested that very thorough business consideration should be given a proposition contemplating a bond for its source of revenue and advised that in no instance, in his judgment, should a bond be issued running over a greater period than the length of life of the improvement or construction for which the money raised thereby was to be used.

TAXATION OF MOTOR VEHICLES.

A paper was presented by W. V. Hill, discussing the taxation of motor vehicles and the regulation thereof in its relation to other public carriers.

LIMITATION OF EXPENDITURES.

Mr. Clark, formerly a member of the Revenue and Taxation Department of New Mexico, being present was called upon to discuss the New Mexico law and especially its relation and operation with reference to limits of expenditures, both county and state. He explained at length and instructively the working of the New Mexico law wherein it limited the amount of money that might be expended in any subdivision of the estate to a small percentage over what has been used for the purpose the preceding year. At the conclusion of Mr. Clark's explanation, the question was further ably discussed by State Controller John S. Chambers and Clyde L. Seavey, chairman of the State Taxation Commission.

TAXATION OF GROSS RECEIPTS.

L. E. W. Pioda presented a paper on the subject of taxation of gross receipts and the attendant double taxation sometimes occurring therefrom. Mr. Pioda made a special point of that feature in Constitutional Amendment No. 1 which fixes as a tax a percentage on the gross receipts of power companies and electric railway companies, and showed clearly how a double taxation sometimes occurs by the sale of the same product by two corporations; that is to say, its sale by the first corporation to the second and its final distribution by the second corporation, which would cause it to show in the gross receipts of both companies.

A paper was then presented by E. A. De Camp on the subject, "Best methods in revenue and taxation."

The association adjourned to reassemble Thursday, 10 a.m.

The association reconvened at 10 o'clock Thursday.

CENTRAL CONTROL OF ASSESSMENTS AND CLOSER COOPERATION BETWEEN COUNTY ASSESSORS AND THE STATE BOARD OF EQUALIZATION.

An able paper was read by R. E. Collins, chairman of the State Board of Equalization, reviewing the taxation system and calling attention to the new taxation laws. Mr. Collins dwelt upon the point of central control of assessments as manifest in the creation of the State Board of Equalization and advocated a closer cooperation between the county assessors and the state board. In this suggestion, however, he was largely prompted by suggestions from the county assessors themselves. The explanation for the lesser active supervision at present than in former times was fully explained by his calling attention to the fact that the new law commonly known as ''Constitutional Amendment No. 1'' left it unnecessary for the State Board of Equalization to require an equality of assessment as between counties. He complimented the county assessors upon their manifest fairness in determining upon the question of operative properties and advocated that the first additional power that should be granted the State Board of Equalization be a power to call together in annual convention, or oftener if necessary, all county assessors to discuss matters with relation to revenue and taxation.

EXPERIENCE WITH APPRAISEMENTS.

Assessor E. W. Hopkins of Los Angeles was asked to outline briefly the result to Los Angeles County in following out the plan of separate appraisements for assessment purposes. He showed in his paper on the subject some of the obstacles necessary to be overcome and the good results that had obtained in most cases in his experience, at the same time setting forth some of the amusing features of the situation and gave his conclusion that the appraisements no doubt were of very great value for assessment purposes.

STATE TAX COMMISSION.

Clyde L. Seavey, chairman of the State Tax Commission, was called upon to set forth, as far as consistent with his plans, the conclusions that his commission had reached by their investigation of the subject of revenue and taxation. Mr. Seavey reviewed at length the ground gone over by his commission in various directions for the compiling of data from which conclusions might be arrived at. He made a special point of plans they were following in the examination, classification, and analysis of soils, for a better basis upon which to fix values and gave as his opinion that a complete record along the line shown in the exhibits, which he presented to the association, would make a practically permanent record of very great value for such purpose.

Mr. Seavey discussed county and state expenditures and their relation to each other, or rather to the taxpayer, and showed how, in his opinion, the separation of state and county tax and the raising of revenue from the income of corporations for state support brought about an unhealthy condition, which he seemed to think could best be remedied by an ad valorem system of taxation for all purposes, both state and county, and a state rate to be collected by the county. He advocated, however, the assessment of considerable of the corporate property by a central body, as well as the collection of the tax thereon in the same manner. Mr. Seavey said at this point, in answer to a question of Assessor Lack of Shasta County, that he had no plan as yet outlined as to just how this central control should be exercised or how the assessments or collections should be returned to the counties.

The question brought out a lengthy discussion between T. M. Eby, secretary of the State Board of Equalization, M. D. Lack, assessor of Shasta County, John Ginty, assessor of San Francisco County, G. P. Cummings, assessor of Fresno County, Clio L. Lloyd, assessor of Santa Barbara County, Ed J. Kay, assessor of Sacramento County. At the conclusion no definite plan was agreed upon.

THURSDAY P. M.

Further explanations and discussions by Clyde L. Seavey of the State Tax Commission in his talk on ''Needed legislation and other revenue matters,'' together with the discussion occasioned thereby occupied most of the afternoon.

A paper embracing an outline was presented by James Stafford who had immediate charge of the appraisements and valuations in Los Angeles County. He gave at length his system of arriving at values and explained the various elements considered by him in fixing values of city property, as well as outside or country property.

ELECTION OF OFFICERS.

Election of officers for the ensuing year resulted as follows:

President, M. M. Moulton, assessor of San Diego County.
Vice President, P. H. Cochrane, assessor of Marin County.
Treasurer, George W. Murray, assessor of Kings County.
Secretary, M. D. Lack, assessor of Shasta County.

SELECTION OF NEXT MEETING PLACE.

The cities of Santa Cruz, Sacramento, Redding, and San Bernardino extended invitations and urgent telegraphic requests for the association to meet with them in 1917. Redding was finally selected as the next meeting place. President-elect M. M. Moulton then announced the following committees:

COMMITTEES.

COMMITTEE ON PROGRAM AND ORDER OF BUSINESS.

M. D. Lack, G. P. Cummings, E. E. Long, and John Ginty.

ADVISORY COMMITTEE.

James Sleeper, A. E. Morton, I. H. Clay, E. J. Gilbert, C. Y. Pitman, Clio L. Lloyd, and Russell Brownell.

EXECUTIVE COMMITTEE.

George A. Threlfall, George O. Meese, W. M. Weaver, C. B. Bayley, V. L. Jones, George W. McConnell, and H. J. Squires.

LAW AND LEGISLATIVE COMMITTEE.

Ed J. Kay, C. E. Jarvis, M. D. Lack, P. H. Cochrane, John Ginty, George P. Cummings, Ed W. Hopkins, Robert Corlett, D. P. Flynn, and E. E. Long.

The association then adjourned to reconvene at 9 o'clock p.m. at the Barbara Worth Hotel, where the El Centro Chamber of Commerce had provided an elaborate banquet consisting entirely of Imperial Valley products.

On Friday morning at 10 a.m. the members were met at the Barbara Worth Hotel by the citizens of El Centro and taken over the valley for an automobile trip, which proved to be instructive, as well as entertaining.

Resolutions were adopted thanking the people of El Centro for their hospitality and entertainment, and the press for their liberal space allowed the proceedings of the association.

The association then adjourned to meet at Redding in 1917.

RANDOM THOUGHTS ON VALUATIONS.

By John Ginty, Assessor of San Francisco.

Students in taxation usually think that all property should be assessed on a 100 per cent valuation; that the selling price should be the only evidence of values, without any safety factor for bad judgment of the buyer.

If the recorder's books show that "A" paid $1,000 for a certain lot, should that sale fix the assessment value of the lot and become the basis of assessment of adjoining property? Was the amount named in the deed the actual consideration, or was it a fictitious amount intended to be used as a selling argument, or to mislead a mortgagee and obtain an excessive loan? Who is Mr. "A"? Is he an apprentice in a machine shop? A janitor? Has he recently graduated from school, or is he a novice who has inherited some money? How did he acquire a knowledge of values? What argument did the seller use to separate the buyer from his $1,000? Did the glib tongue of a real estate agent assure him that he would double his money in a year, or other hypnotic stories, to convince him it was the chance of his life to make a good investment? What will be his loss, when he sells it?

Section 3617 defines full cash value as the amount at which property would be taken in payment of a just debt from a solvent debtor. A former member of the State Board of Equalization, who had been a member of the legislature when this section was adopted, said it meant that a solvent debtor, presenting a deed for a lot, consideration named in the deed being $1,000, also offered $1,000 gold coin, and told his creditor to take his choice in payment of his debt. If the creditor accepted the deed, it established the value of the property at $1,000.

The rejection of the deed and acceptance of the gold coin might imply that the property was not worth $1,000.

Benjamin Franklin said, "Never buy what you do not want because it is cheap."

A dry goods merchant would not likely take hardware or secondhand furniture in payment of a bill if he could get the money.

The Supreme Court of the United States defines value as the amount a "willing buyer would pay to a willing seller for his property." This is as indefinite as our code law, neither of which takes into consideration the knowledge of the value by the buyer or seller. In 29 Cal. 449, the court said the legislature can not, by law, fix the assessed value of property. In 112 Cal. 593, the court said mandamus will not lie to compel the assessor to assess in excess of its value, but it is the duty of the assessor to fix the valuation, and any error in valuation to be corrected by the Board of Equalization.

The state law forbids a savings bank loaning more than 60 per cent of the market value on land, and the banker is the judge of the market or 100 per cent value. The bill for the rural credit banks limits the loan to 50 per cent of the market value of the land. The chairman of the Rural Credit Commission in a speech he made recently in San Francisco said in appraising land in California, nothing would be added for blue skies or the scenery.

Bank officers are supposed to be shrewder or more conservative than the average man. As a matter of fact, bankers seldom loan over 50 per cent of the market value; moreover that value is on their own judgment.

Why should an assessor assess at 100 per cent, or at the buyer's valuation, without any margin or safety factor for bad judgment? Every other business man uses a safety factor in his estimates and cost of conducting his business.

If the bank forecloses the mortgage, the property is sold at auction; if the taxpayer does not pay the taxes, it is struck off to the state, and in five years the state sells it at auction for the taxes; the collection in either case is by public auction. The state must not sell for a sum less than the taxes, penalties and interest. The banker does not always get his whole principal and interest.

What a remarkable man a one-hundred-per-cent assessor would be if he is proof against mistakes.

If all are assessed in the same proportion no injustice is done. If the tax rate is increased all taxpayers know all are treated alike and know expenses of the government have been increased. If a taxpayer's assessment is raised by the assessor, he has no knowledge that the increase is uniform or that the ratio has been increased.

I have before me the United States Census Department book entitled, "Wealth, Debt and Taxation," of 153 cities in 42 states, each city having a population of not less than 30,000. Fifty-one cities are assessed on a 100 per cent valuation, 1 on 96 per cent, 1 on 98 per cent, 1 on 89 per cent, 3 on 85 per cent, 15 on 80 per cent, 7 on 75 per cent, 1 on 72 per cent, 4 on 70 per cent, 4 on 66⅔ per cent, 2 on 65 per cent, 11 on 60 per cent, 1 on 52½ per cent, 10 on 50 per cent, 2 on 45 per cent, 1 on 42 per cent, 3 on 40 per cent, 1 on 35 per cent, 4 on 33⅓ per cent, 1 on 25 per cent, 2 on 20 per cent.

New York City claims to assess on 100 per cent valuation.

I have the assessment department report for 1915 showing the following table:

Table of Sales for the Year 1914, Showing Considerations, Assessed Values and Per Cent.

Borough	Number of sales	Consideration	Assessed value	Per cent
Manhattan	860	$41,483,664 00	$44,561,100 00	107
Bronx	408	5,681,468 00	6,061,140 00	105
Brooklyn	1,020	8,516,503 00	8,749,969 00	102
Queens	243	916,849 00	915,015 00	99
Richmond	168	383,616 00	311,595 00	81
Totals	2,699	$56,982,100 00	$60,553,819 00	106

I also have clippings from New York daily papers reporting sales in the down-town wholesale district, of property being sold at 40 per cent less than assessed values. Justice demands a safety factor in assessors' estimates of values to govern cases similar to this which occur in every assessor's office.

In 1912 I read a paper before the Assessors' Convention in Los Angeles, explaining a unit system, similar to the Somers system of assessing which I had used in 1912. One of my fellow assessors told me San Francisco had only city lots and blocks, and the unit system might work all right there, but what kind of a system would you use in the farming counties in assessing all kinds of farming lands, hills, mountains, swamps and bare bedrock? My answer was that I would invent one. The late A. B. Nye, then State Controller, strongly urged me to prepare a system, as he believed my plan practical. Lack of time and opportunity to study country lands, led me to abandon the work.

Recently I read the prospectus of a company organized in New York, which contemplated appraising country lands for bank credits, investors, colonization, etc., and would insure and guarantee mortgagees'' and investors against loss. Their plan was to standardize appraisements and show what a scientific classification would be.

I am told by persons who have visited Germany, the plan that government has to catch income tax dodgers, and also to serve as an aid to the unsophisticated investor. My informant said if you were traveling in that country, and you saw a piece of land that you thought you would like to buy, by going to the income tax collector you could find out the owner's name and the crop returns for a ten years term, showing the number of bushels of grain or crops per acre, and the market price it sold for. From these figures you could find out that if planted in rye or any other crop, the income would justify you in paying so much per acre to receive a certain per cent on your investment, also an analysis of the soil and what kind of crops to plant is given.

I may, during the next year, write to my fellow assessors and ask for information and advice in compiling a standard appraisement plan of farm lands, that would analyze the various elements that go to make land values, and reduce it to a percentage table for each element of value that could be added or deducted from an imaginary standard of 100 per cent. The unit 100 per cent land to represent a certain quality of land, not its value in dollars, for a 100 per cent acre of land in San Joaquin County, owing to transportation facilities, schools, markets, climate and social conditions, would sell for more than the same identical quality of land in Del Norte County. Thus the increase or decrease in sales value in different parts of the state could be accounted for in a percentage table of the values of each per cent that represented certain elements.

An assayer can analyze a piece of ore and give you the value of each metal in it, a chemist can likewise give you all the chemical elements in soil, water or other substances, in a percentage table. Can the value of land be likewise resolved into the elements or conditions that go to make its sale value? All insurance companies' rates are based on a unit or perfect risk and additional rates are added for each additional risk.

If my fellow assessors will assist me in getting the different elements in values in their county, and advice in making a percentage table for their use only, it may prove profitable to them, as they would become the authority on values for mortagees, bankers, investors and colonizers, and lead to what might be called a clearing house for values in trades or exchanges of property in the various counties. In my county, the banks would like to loan on country land, but want a standard appraisement instead of an opinion of an appraiser, unfortified by a percentage table of the elements of values or explanation of how they arrived at their appraised value. Investors and speculators would become willing buyers if you could show them the reason for appraised values.

CENTRAL CONTROL OF ASSESSMENTS.

By R. E. COLLINS, Chairman State Board of Equalization.

At the October meeting of the State Board of Equalization one of your most prominent members—one of the best known county assessors in California—during the course of an informal talk before the board, frankly criticized it because it had not in recent years kept in closer touch with the work of the assessors. He called the board's attention to the fact that the state's new tax system had not taken from it any of its powers of supervision or equalization and intimated he thought the board had been unduly negligent.

It is gratifying, at least, to learn that the county assessors of California, if this particular member of your association represents your views, desire to be more closely watched and guided by the State Board of Equalization. Such a spirit is in keeping with suggestions I will make later on.

It appears that a similar feeling does not prevail among all the assessors—certainly is not shared by this particular assessor—as to the new law granting to boards of supervisors the power to appoint appraisers, or assistant assessors, to help county assessors in their work, more particularly in bringing about greater uniformity in valuations. But be that as it may, the board is complimented at the confidence reposed in it.

But why should the board, at least in so far as equalization is concerned, have continued to keep in touch with the work of the county assessors? From the point of view of state revenue, the necessity of equalizing "as between counties" no longer exists; and while it did exist it was inequitable because the power did not lie to equalize within a county.

Moreover, with the adoption of the state's new tax system, whereby general property was left to the counties and the franchises and earnings of the corporations were taken over by the state for revenue purposes, it was felt that a species of "home rule" for the counties had been established, and therefore the board "shinneyed on its own side."

I do think, however, that it would have been well had the board kept in closer touch with the assessors, not so much for the purpose of equalization as to have gathered data as to valuations and kindred questions for general information and special use in emergencies such as arose just before the 1915 session of the legislature, when it was proposed to raise the corporation rates but information was lacking as to how these rates compared with the rates on general property.

In my judgment, even under our present dual tax system, there should be a central authority with power to equalize not only as between counties, but within a county—with power to truly equalize and direct all assessments for local purposes. Such a central authority, I am frank to say, should be the State Board of Equalization. The power should be lodged there. If not, then such centralized authority should rest, not in an appointive board, but in an elected board, the members properly representing various sections of the state.

The injustice of equalizing as between counties is too obvious to require argument. Such wholesale equalization necessarily, while correcting undervaluation here and there, would work injustice in the instances where the assessments were proportionately fair.

But even such lopsided equalization calls for a central authority, and such authority must be a state body of some kind. To extend the power of equalization to assessments within a county, does not call for a new central authority; merely for more power for the centralized body already in existence.

The Board of Equalization now has, it is true, the power it always has had to equalize as between counties; but not only has the state's new system of taxation taken away the incentive to exercise this authority, but the inequity of such blanket equalization puts a further damper on such action. If, however, the board should be given the power not only to equalize as between counties but within a county, and also to require regular reports to be made to it as to property values and the work of the assessors during the assessing period, not only would the way be open to correct inequalities as between classes of property, but also much information of great value would be obtained in systematic fashion, available for general and special use.

It is clearly understood, I sincerely hope, that these remarks are not made in a spirit of criticism of the county assessors. Such is far from my purpose. But necessarily with fifty-eight large counties to reckon with, inequalities calling for correction not only within a county but as between counties even under our present double taxation system, will arise. I do not charge bad faith anywhere. But conditions are such as necessarily will develop differences and inequalities. Hence the need of a central authority to act as a balance wheel.

One of your most prominent members, as I already have stated, has criticized the board for not exercising the authority it now has. He has admitted the need of supervision—certainly as to himself and presumably as to all his brother assessors. I am merely agreeing with him and endeavoring to point out how this supervision can best be exercised.

There is one additional power, at least, the Board of Equalization should have, whether granted any other or not, and that is to convene the assessors in annual convention, or oftener, to discuss matters, general or specific, relating to assessments, valuations, comparisons and so on. Even as matters stand, this should be done, and it would be even more necessary should the other suggestions I have made be adopted.

Of course, the necessary traveling expenses of the assessors should be paid, either by the state or the counties; and attendance should be made compulsory.

I am convinced that not only would the state and the counties get back the cost, but a very great deal more—that such conferences would result in vast benefit to California. This has been demonstrated by the annual conventions now held by the assessors at their own expense, although, and naturally, they have not been well attended.

I certainly hope that steps will be taken to secure legislation that will make possible the holding of such gatherings, with expenses paid and attendance compulsory.

In closing, I want to compliment the county assessors of California upon their cooperation in the matter of the settlement of questions as to operative properties, upon the assistance they have given and their evident desire to be fair in their judgment.

Also, I want to thank the assessors in the name of the Board of Equalization for their uniform courtesy to my associates and myself, for their evident good will toward us. And I want to assure you of a like good will upon our part for you.

I thank you.

COST OF GOVERNMENT.

By JOHN S. CHAMBERS, State Controller.

You gentlemen, as county assessors, and members of the State Board of Equalization and the State Tax Commission, are chiefly concerned in matters pertaining to revenue and taxation—in producing revenue or laying the foundation so that revenue may be produced. Your official duties take you along such lines. The State Controller, however, is more concerned as to expenditures or disbursements. His duty is to supervise expenditures—''payments,'' the federal government prefers to call them. And so, with your permission, I would like to talk to you a little while upon this topic.

Necessarily, of course, intimate relations exist between disbursements or government payments and revenue and taxation. Taxation, generally speaking, reflects disbursements. If there were no disbursements, no cost of government, there would be no need of public revenue and taxation would be unknown.

CONTROLLER AND BOARD OF EQUALIZATION.

I have not forgotten, of course, that in California the controller is a member, ex officio, of the Board of Equalization. But he should not be. In the early days of the state's history, perhaps his time permitted him to sit with the board. It certainly does not now. But even if it did, I question the propriety of the state's chief disbursing official, no matter who he may be, occupying two such positions. But the constitution provides for it and only the people can change the constitution. There might be objections on political grounds to such a rearrangement, but there could be none from the standpoint of a proper alignment of duties and efficiency.

Speaking personally, I am glad that when I came into office, the controller was a member of the Board of Equalization. Not only have my relations with the members of the board been pleasant, and with several of them particularly friendly, but it was through my connection with the board that I was brought in touch with the county asssesors of the state and thus was enabled to make not only many new acquaintances, but, I hope friends—enduring friendships.

My previous remarks related only to the official situation. The Board of Equalization is in session from March to July of each year. The controller's responsibilities and duties as a member of the board are as great as those of any of his associates. Yet, it should be evident that he can not spare this time from his own office.

The controller's office consists of the Auditing and Disbursing Department. the Inheritance Tax Department, the Corporation Tax Collection Department, the Delinquent Tax Land Department and the department which deals with the annual financial transactions of the counties, cities and towns of the state.

This is pretty near enough to keep one man busy. But, on top of all this, in addition to his connection with the Board of Equalization, the controller is a member of the Corporation License Tax Exemption Board, with the Board of Control and the Secretary of State; a member of the State Loan Board. with the Governor and the treasurer; and, also, every two years cooperates with the Board of Control in preparing the biennial state budget for submission to the Governor and the legislature.

GREAT GROWTH IN EXPENDITURES.

But I have drifted far from what I wanted to say to you as to expenditures. There has been, all of you know, much complaint in recent years as to our ever-growing expenditures and ever-growing tax burdens. In the past twenty years this growth has been particularly heavy. Expenditures have increased faster than population and probably faster than wealth or income. There has been a marked expansion in the functions and cost of government. What are the causes? Are they justified? How long is this state of affairs to continue?

It is well enough to say that the people rule, that the final responsibility is upon them. But all of us know that it would not be humanly possible for all the people, or anything like a sufficient number of them to influence public sentiment, to keep in intelligent touch with the intricate affairs of government, especially financial affairs. The responsibility is upon those who are in touch with conditions, not that they cause the extra burdens, but because they are in a position to know many of the causes, to know the trend of affairs, and it is their duty, in consequence, to tell what they know, to sound warnings. Then if the people fail to heed them, they are absolved.

I know that figures bore, particularly when they are read, but I would like to submit a few in order to show the startling growth in government payments, not only upon the part of the state and her counties and cities, but also as to other states and the nation, as well.

CALIFORNIA TOTALS.

The total receipts of California and its cities and counties for 1915, from all sources, was $167,012,148, and the expenditures for all purposes, $176,422,681.

As the controller's office did not begin to keep a record of the financial transactions of the state's subdivisions until five years ago, I can only give the percentages of increase as to receipts and expenditures for the cities and counties for that period. One or two of my predecessors tried to gather data of this kind, but having no law, as we now have, to back them, failed.

STATE.

The state's receipts from all sources in 1915 were $29,830,182, an increase of 66.7 per cent in five years. The average of all the states for the ten-year period running from 1903 to 1913, was 94.3 per cent, California's increase in that decade having been 91 per cent, and the federal government's, 45 per cent.

The state's 1915 expenditures for all purposes totaled $36,529,593, an increase of 103 per cent for the five years in question, as against an average of 105.9 per cent for all the states from 1903 to 1913, with an increase in that decade of 115 per cent for California and 54.5 per cent for the Washington government.

California's percentages of increase for receipts and expenditures on the five-year basis is under that of the average of all the states on the ten-year showing, but for the decade quoted her expenditures are slightly over the average of the other states.

CITY.

The city receipts for 1915, including San Francisco, were $68,724,578, an increase of 46.9 per cent in five years, as against a 99 per cent increase for all the cities in the country, from 1903 to 1913.

Expenditures by California cities, including San Francisco, for 1915 totaled $69,922,592, an increase in five years of 59.5 per cent, compared with 101 per cent, average, for all this nation's cities for the decade in question.

COUNTY.

The counties of the state, exclusive of San Francisco, collected in 1915 the sum of $68,457,388, an increase of 66.5 per cent in five years, as against 85.8 per cent, average ten-year advance, for all the counties of the country.

And the counties, in 1915, expended $69,970,496, or 78.2 per cent more than five years before, as against 95.2 per cent, average, for all the counties of the various states of the Union in the ten years from 1903 to 1913.

CALIFORNIA'S AVERAGE.

Summed up, taking California alone, her receipts, together with those of her counties and cities, increased in five years 60 per cent, while the combined expenditures increased 80 per cent.

The average of all the states for the ten years running from 1903 to 1913, including their subdivisions, was, as to receipts, 93 per cent, and as to expenditures, nearly 101 per cent.

I am not endeavoring to make out a "good case" for California especially, but rather to show that conditions of which we in this state complain are general. Apparently we are better off than the average, but this is on a five-year showing for us as compared with a ten-year showing for all the others. Perhaps if we had complete county and city figures for the decade, California would not fare so well.

But that is not the question. Even the increases as shown here—state, county and city—are certainly heavy enough to cause grave concern, to warn us that we have drifted quite far enough, that the time has come for earnest thought, for the putting on of the brakes, for looking ahead. And so, with the basis laid, let us consider causes and remedies.

SCHOOLS, HOSPITALS AND PRISONS.

The support of our schools, our prisons and our hospitals constitute a heavy drain upon the people, whether considered from the point of view of the state, the counties or the cities. So, too, do our numerous elections.

I recall, while attending the National Tax Association Convention at Denver in 1914, hearing a delegate declare that our schools were costing far too much, that as good or better results could and should be secured with the expenditure of much less money, that those in charge of school finances, as a rule, were not business men—practical men—however worthy in other ways, and so full value was by no means received for every dollar expended. Doubtless there was much truth in what the delegate stated. A like criticism might apply, also, to other departments of government. The central idea in this delegate's mind was that by temperament and training educators were not fitted to manage the fiscal affairs of the schools to the best advantage. But the people, I take it, would rather err in the matter of overcost than undercost where the education of the children of the country is at stake.

COST OF SCHOOLS.

We are spending in California approximately $36,000,000 a year upon our schools, including the university, the normals, the common and the high schools; salaries of teachers, buildings, upkeep and so forth. This, upon an estimated population of 3,000,000, means a per capita for the state, counties and cities of $12.00.

I have not the data for comparison with all the other states. The data available as to state governments is far from satisfactory. In 1915, for example, the state government of California contributed to the local communities for the support of the common and the high schools over $5,000,000, while that of Massachusetts gave only $204,879. It is simply a difference in system, the Eastern commonwealth throwing practically the entire burden of collection and distribution upon the local governments, while here a great part of the revenue is collected by the state and distributed to the schools. Accordingly, on a per capita basis, California would appear, upon a superficial showing, to be expending infinitely more than Massachusetts upon education.

IN FRONT RANK.

There is no doubt, however, that California is in the very front rank in the matter of expenditures for this purpose. Early in 1915, I had occasion to compare school disbursements by our state government, in 1913, with those of nine other states, two selected from the East, two (including California) from the West, two from the North, two from the South and two from the Central group, the estimated population of each being approximately the same. California's per capita was $2.99 as compared with an average for the ten states of $1.90. Her percentage of cost as compared with her receipts was 38 per cent, yet this figure was exceeded by six of the other states.

I merely submit these figures and this data for consideration. Like the entire subject of expenditures, the school phase of it calls for thorough investigation before the passing of judgment. If disbursements are too heavy, we can not hope to curtail them as they should be unless we know where the fault lies.

HOSPITAL AND PRISON COST.

The cost of our prisons, our reformatories, our hospitals and benevolent institutions also is a tremendous burden. I have taken the totals for the state, the counties and the cities, which under such classified headings as "Protection to Life and Property" include city fire departments also, and find that for 1915 they aggregated over $26,000,000, or a per capita of nearly $9.00.

California, from the prison and hospital point of view, is in a peculiar position. Facing the Pacific, she is, so far as our country is concerned, the "end of the world," the "jumping-off place." The mental and moral derelicts reach here and stop. They can go no further, and there is little incentive to induce them to return whence they came. So the result is, they become a burden upon California, and I think there is no manner of doubt that our percentage of cost for the care of these unfortunates is away above the average.

I am convinced from personal knowledge of the situation that our state hospitals are being economically conducted and I think, too, our state prisons. My opportunities of judging as to city and county hospitals and prisons have not been so good, but it is fair to presume, I think, that being so many in number and under such scattered authority they are not nearly so well in hand as are our state institutions of a similar character which are under centralized authority, close supervision and are fairly free of political entanglements.

ELECTIONS.

I have not had an opportunity to tabulate data as to the cost of elections, and for that matter such data as I have in my office is not complete. But all of us know that elections occur frequently, all of us know that it costs money to hold an election and it follows, therefore, that the total must be heavy. It will average at least $1,500,000 a year. It seems to me that this phase of the expenditure situation offers a fine field for investigation and improvement.

I am not endeavoring, of course, to call your attention to the entire line of disbursements for various general purposes, but rather by selecting the more important to suggest that where expenditures are the heaviest perhaps will be found the best opportunities for retrenchment. I will take up, along that line, two other main topics—new functions and bonded indebtedness—before considering governmental efficiency from the standpoint of general and departmental management.

NEW FUNCTIONS.

There is no doubt that one cause which has contributed heavily to the increased cost of government is the assumption of new functions, particularly by many of the states and to a lesser extent by the national government. But it is true, also, that while many of these functions have added, in the shape of taxes, to the people's burden, they have, at the same time, saved them in other ways as much and often far more than they cost. And beyond the dollar and cent point of view, must be considered what some of these functions do for the general good—the conservation of health and like, making the world more worth while for the men and the women who toil. All of which may be grouped under the heading "humanitarian legislation."

Are all of the various new functions necessary? Do all of them properly fall under governmental jurisdiction? Would it be possible to consolidate two or more under one control and thus reduce the overhead? Is the assumption of more and more new functions to continue indefinitely? These and similar questions must be considered. While it is highly desirable to reduce the cost of government, it must not be done at the expense of efficiency or the minimization or elimination of functions which make for public welfare.

COST MORE THAN SAVED.

While our State Railroad Commission is not new in name, it is new in the scope of many of the functions it is discharging and particularly new in faithfulness to its duties. This commission, while expensive, undoubtedly has saved far more to the people of this state than it has cost them. And so, too, with the Board of Control, known before 1911 as the Board of Examiners. Its powers were very greatly enlarged with the change in name and to date it has performed a great public service, although not without much friction and some injustice, perhaps.

Many of the new functions—now realities—were mere suggestions ten and fifteen years ago and mere dreams before that time. There are, for example, the Social Insurance Commission, the Industrial Accident Commission, the Industrial Welfare Commission, the Immigration and Housing Commission, the Water Commission, the Rural Credits Commission, the State Market Commission, the Bureau of Labor Statistics, the State Children's Agents, the State Purchasing Department, the Legislative Counsel Bureau and so on and so forth.

These and similar functions have come to us in the past few years, and to a number of other states, also. It may be that we would do away with a few, if any, of them, but it is probable that a number of them, similar in purpose, could be consolidated. The opening invites entrance, and not only as to new functions, but, also as to several of the older ones. The suggestion, I think, is worth very serious consideration.

BONDED INDEBTEDNESS.

Now, as to bonded indebtedness. Not only has the state been burdened, but more particularly the cities and the counties. With others, I have protested against the public habit of voting long-term, high-rate bonds for nearly any old purpose, and, with others, I have advocated low-rate, serial bond issues, the life of which should not exceed and preferably should be shorter than the life of the contemplated improvement.

No one, I assume, advocates the complete cessation of bond issues. That would be impracticable. Such a thing would check too greatly, if it would not stop development.

But we should confine bond issues to matters of the first importance, going meantime as far as is wise by direct taxation, and also bearing in mind that it is not up to us of this day and generation to complete the full development of the world or even our particular part of it.

SAN FRANCISCO HARBOR BONDS.

Let me give you something to think about. Back in 1913, the people voted bonds in the sum of $10,000,000 for San Francisco harbor improvement purposes. These bonds bear interest at the rate of 4 per cent, which is payable semiannually. But no redemption can be made until 1954, with the final redemption in 1989, so for thirty-seven years from now, or possibly it will be thirty-six years by the time the bonds are marketed, the lot of $1,000,000 of this authorized issue recently offered for sale, can not be redeemed, although they will bear interest all the while. And this means that every $1,000 bond of this particular batch will cost, by 1954, $2,440.

There is no such thing, I take it, as a "permanent improvement"—an improvement that will last until the last trumpet call. All improvements require care and maintenance and in time, long or short, are replaced. This is particularly true of docks, more especially the piling upon which they stand. And so in this San Francisco harbor issue, not only are we likely to see replacement begin before the ultimate retirement of the bonds, but very probably, in large part, before redemption begins thirty-six years hence.

THE GRAND TOTAL.

The total bonded indebtedness today of the state and the counties and cities exceeds $250,000,000 and the annual interest thereon is over

$10,000,000. Of this vast sum, the state's part is more than $31,000,000, with $15,000,000 worth of bonds on hand unsold; the counties owe over $92,000,000, and the cities nearly $130,000,000. God only knows what the counties and cities hold to be sold later.

In the past five years, the bonded indebtedness of California, including counties and cities, has increased 285 per cent! Surely the time has come when we should "stop, look and listen"; surely the speed is such that we should put on the brakes!

This great bonded debt, plus the interest, must be paid by taxation. Its staggerly total is sufficient in itself to indicate how the taxpayer's burden has been increased by our reckless habit of voting bonds promiscuously. Nor is it really decreased by the statement that the state's portion will be paid by the corporations—from the state tax upon corporations. It is true the state will pay off its bonded debt by money collected from such a tax, but the corporations first collect the tax through increased rates and prices to the consumer.

GENERAL MANAGEMENT.

Now in the matter of general and departmental management, we all know that ever since civilized government began incompetence, negligence, waste, and, to a greater or less extent, dishonesty, have existed and always will while human nature remains as it is. A proper system may force a dishonest person to be honest, a negligent person industrious and a wasteful person careful, but an incompetent person can not rise above a certain level, method or no method. He may be helped, but he can not be cured.

That the taxpayer's burden has been made much heavier by these four causes is too well known to require discussion. The issue is to ascertain how these causes can be minimized. We can not, of course, hope to eliminate them.

UNIFORM ACCOUNTING.

Uniform systems of accounting for the state, the counties and the cities will go a long way toward improving conditions. In California, the state government's accounting, bookkeeping and reporting are upon a uniform basis; the State Board of Control has begun this work in the counties, and in due time plans to give similar attention to the cities.

It is obvious, of course, that an efficient system of accounting for any political subdivision will prove beneficial to that community and equally obvious, I think, that where such a system prevails in all like subdivisions it will prove of general benefit, making it possible to work out comparisons as to the cost of government and other questions along related lines which will assist materially in the consideration of the problem of expenditures.

But the operation of uniform systems of accounting in our counties and cities, for example, carries with it, necessarily, the idea of a central authority which must have installed such systems and implies a continuance of such authority to see that the systems are maintained. And the only logical central authority for such a purpose under our forms of government is that of the state.

Naturally, at first, the subdivisions do not take kindly to this supervision, but in view of the great good that will result from uniform accounting and the fact that after such a system is once well in operation the state may not be much in evidence, I do not think the opposition will be long lived. I believe, in fact, that there will be cordial cooperation between all concerned in due time.

THE BUDGET.

Not the least good that uniform accounting accomplishes is that it makes it easier to prepare a budget. I consider a budget one of the essentials in an orderly way of conducting public business, in gaining an intelligent conception as to receipts and expenditures, the source of the one and the distribution of the latter, and thus making it possible to prepare proper estimates and to check disbursements.

Not only can a budget system be utilized under any of our forms of political government—nation, state, county or city—but it positively should be if the management of fiscal affairs is to be efficient. While it is true that the so-styled scientific budget, which calls for a central and responsible financial authority, like a president or a governor invested with special powers, is not particularly applicable to the average form of government in force in our counties or cities, still a budget system that will prove practicable and efficient is easy to outline and operate.

SCIENTIFIC BUDGET IMPRACTICABLE.

In fact, under neither our national nor our state form of government is the scientific budget workable to the full degree. But while financial authority can not be positively centralized with us and a "government"—to use the British phrase—made to stand or fall as its financial plan is adopted or rejected, it is practicable for us, nevertheless, to so arrange a fiscal program as to fairly well fix responsibility, show past disbursements, estimates of receipts for a certain period and approval in detail of proposed expenditures. Under such a system, particularly if due publicity be given the program, expenditures not only should be held within the revenue, but no legislative body is likely to materially alter the budget for the worse from the standpoint of the taxpayer.

A proper budget, backed by a uniform system of accounting and reporting, will go a very long long way indeed toward solving the problem of growing public expenditures. It means a simple, orderly, public and effective way of doing business. Incompetency will have little chance to survive under such a system, negligence and dishonesty will be easily detected and therefore greatly minimized, waste reduced and efficiency established.

BUDGET AND BONDS.

There is one thing a budget can not do, however. It may discourage for a time at least the adoption of new functions, since expenditures should be kept within the tax revenue out of which such things are paid, but it can not prevent the people, who are supreme, from voting bonds. No system we may devise under our forms of government can stop the people from doing as they please when they make up their minds, or a majority of them do, that they want this or that done. But if due publicity be given to what the budget has to say about receipts and expenditures, it may have a deterrent effect upon bond issues. So even in this field the budget is of use.

EXPENDITURE LIMIT LAW.

In connection with uniform accounting and a budget system, a tax rate limit, or more preferably, an expenditure limit law, to the effect that expenditures in any one year shall not exceed those of the year before by more than a certain percentage, should prove most effective.

It seems to me that after an intelligent study of existing conditions in any county or city shall have been made, and the situation outlined, following such an investigation, in order to prepare a basis, that with these three safeguards—uniform accounting, a budget and an expenditure limit law—the growth of the tax burden not only should be checked but kept under intelligent control from that time on.

THE STATE AND LIMIT LAWS.

The state, while easier to regulate in some respects, is not so amenable to an expenditure limit law as are the counties and cities. These latter still tax general property and the rates are fixed by city trustees or county supervisors upon the assessment roll, but the state rates upon corporations are fixed by law. They can not be changed by the Board of Equalization, which assesses the corporations, but only by the legislature. So as these fixed rates are applied to the board's assessments will the revenue be. Assessments can not be controlled by law. And in addition, the state has many more important sources of revenue, such as that from inheritances or corporation licenses, that can not be limited.

Of course, notwithstanding, expenditures could be held down by only authorizing a certain percentage of increase for one year over the preceding. But it is better to limit revenue to correspond with proper expenditures, where it can be done. Still rather than have waste, it might be well to limit a state as well as a county or a city. Should a surplus then develop, either it could be expended by legislative act or acts for a proper purpose or purposes, or tax rates could be reduced so as to avoid the indefinite collection of more money than is legitimately required.

TAXATION.

Taxation, generally speaking, as I already have said, reflects expenditures, and the tax system in effect is a matter of prime importance in the consideration of public expenditures. The basic purpose of taxation is to raise sufficient funds for the proper support of the government, but beyond that, and equally important from the standpoint of justice, the tax system in operation should distribute the burden proportionately, so that no citizen or class of citizens, or object of taxation or group of objects, should pay unduly.

We no more can expect to attain perfection in this respect than in anything else human. While we know there has been too great a growth in expenditures, still much of the complaint we hear may come from people who are carrying more of the burden than they should, so hand in hand with the study of public disbursements should go a study of tax systems. Not only should it be our aim to reduce the cost of government where found excessive, but we also should aim to see that this cost is distributed fairly among the taxpayers.

TAXATION OF MOTOR VEHICLES COMMONLY CALLED JITNEYS AND INTERURBAN MOTOR BUSSES, ENGAGED IN THE BUSINESS OF COMMON CARRIERS.

By W. V. HILL, Manager California Electric Railway Association.

It has been my pleasure to have been present at your annual conventions for the past six years. This is the first time, however, that I have had the temerity and felt the necessity of asking your kind indulgence, that I may say a few words on a question of vital interest to you, the public in general and the electric railways in this state.

In dealing with this problem, I shall endeavor to confine my remarks as far as possible to the question of taxation, although this is but one of several issues that are involved.

You know that the electric railways of this state are required, under Amendment No. 1 to the constitution, to pay 5¼ per cent of their gross receipts from operation to the state as a tax; or, about $2,000,000, in round figures this year. In addition to this tax they are required to pay from 1 per cent to 3 per cent of their gross receipts to various cities, under terms of franchises. Then there is the paving tax, which is another requirement under the franchise law. This is a large item. The cost of paving tracks in streets will run from 6 per cent to 10 per cent of the gross receipts of the electric railways in this state. It might be stated here that the paving constructed by the electric lines is not required by them in their operations, but does make it all the more convenient for the jitney to compete with them.

The state tax, franchise percentage paid to cities, and the paving tax will, in the aggregate, average 15 per cent of every dollar taken in by the electric railways. Do you know of any other business that is paying this proportion of its gross receipts in taxes?

Most of you are familiar with the evolution in the transportation business. Some of you no doubt remember when the horse car succeeded the stage coach; the cable car the horse car, and the electric car the cable car and in some cases the steam car in interurban traffic. In each transformation, however, the successor assumed the responsibilities of its predecessor as to dependable service and its proportion of taxation. As a matter of fact, taxation has grown out of all proportions, for you gentlemen are not content with assessing all that is found in tangible property of the electric railways, but you find what is claimed to be an intangible asset in the way of a franchise and some of them have been considered very valuable by you, although I am frank to admit that there is not an electric railway franchise in this state today that is not an actual financial liability, rather than an asset under existing conditions.

The electric railways are now confronted with a most serious situation. The jitney bus has been a competitor of the electric lines for nearly three years. It is here today in large numbers engaged in the public utility business—identical to that of the electric lines, excepting that they operate with rubber-tired wheels on paved street and roads, while the electric cars operate with steel wheels on steel tracks.

The jitney bus has so far evaded practically all semblance of taxation. It is true some cities have required the payment of a license, ranging from $10 to $60 per annum per car. It is also true that they pay to the state a motor vehicle license, ranging from $8.40 for a Ford to a larger amount based on the horsepower of the car. Then there is the tax placed by you gentlemen—the personal property tax, ranging from $6 to $15 per car per annum. By the inclusion of all these items, the average tax paid by each jitney operating in this state will not exceed $40 per annum.

The taxpayers of the state, including the electric railways, have provided them with a free right of way. We now have, therefore, two classes of public utilities competing with each other:

1st: The electric railways, paying an average tax of 15 per cent of gross receipts and providing its own right of way and maintaining the portion of the streets occupied by their tracks and two feet on each side thereof—from one-third to one-half of the entire street.

2d: The jitney, paying practically a nominal license to some cities and nothing in others; making use of the state and county highways for commercial purposes without paying anything therefor, unless you figure the motor vehicle tax, which all automobile owners are required to pay.

I ask in all fairness, do you believe electric railways are receiving a square deal in this state?

It has been estimated that the railways operating in this state lost in 1915 four and a quarter millions of dollars to the jitney. On this basis, the state was the loser to the extent of 5¼ per cent of this amount, or $223,125. Why should not the jitney be compelled to make up these losses in state revenue that they are directly responsible for? In addition to this, why should they not pay to cities, as the electric railways do, a tax for the privilege of using streets and also maintain a portion of these streets as its competitors are required to do?

The proponents of the jitney will tell you that they are paying proportionately as much taxes as the electric lines are, when you take into consideration their investment.

My answer to this is that if the public will furnish the electric railways with a free roadbed and right of way as they do the jitney, and relieve them of the expense of paving their tracks in streets, and then tax them on the basis of their remaining tangible property, they will be more than satisfied.

It has also occurred to me that if the franchises under which the electric railways operate have a taxable value, why should not the right of franchise given the jitney to operate on streets and highways in this state carry a much more valuable taxable asset under present conditions?

It is a serious problem that confronts us; it is too large a question for most of our local officials to handle properly. The State Railroad Commission, which has jurisdiction over other public utilities, should be given the same broad powers over the jitney, in order to enable that body to make a thorough study of the situation and handle it as other like commissions have in other states.

The next legislature, in all fairness, should enact a law that would require the jitney to pay a proper tax that would be the equivalent of their gross receipts to that paid by the electric railways. This can easily be determined on a seating capacity basis.

We know what this unfair competition has resulted in to date. We know that electric lines have been abandoned in several cities; that electric railway expansion is at a standstill—in fact, going backward—and we know that the jitney has not in any way, shape nor form taken the place of these dependable facilities, nor have they been of any benefit to the public in the way of pioneering and developing new territory, as the electric railways did prior to the advent of this class of utility.

All the electric railways are asking for is fair play; that is, by placing their competitors on an equality with them. Then the issue can be decided on its merits; it can not be otherwise.

I believe you gentlemen appreciate this unsound condition. You can render a great service to the public—the taxpayers, in advocating legislation that will result in a fair adjustment of these conditions.

In conclusion I want to remind you that any form of transportation aspiring in whole or in part to the business of the electric railways must eventually succeed to their responsibilities and their obligations to the public.

The grave question before us now is, can the electric railways weather the storm until such time when the public shall come to the full realization of the situation and give us what we are entitled to—a square deal?

ANNUAL CONFERENCE OF THE NATIONAL TAX ASSOCIATION.

Address by JOHN MITCHELL, Member of the State Board of Equalization.

MR. CHAIRMAN AND GENTLEMEN OF THE BOARD: As delegated by Governor Johnson and this board, I attended the Tenth Annual Conference of the National Tax Association held in the city of Indianapolis, August 28–31, and as requested am now making this report of the conference.

First, let me say that I appreciate the honor conferred upon me and the confidence placed in me, in selecting me as the representative of this great state at so important a gathering. As you know, the National Tax Conference is held under the auspices of the National Tax Association. The delegates attending are appointed by governors of states and presidents of universities, and those who attend are, in the main, members of state tax boards or public officials connected in some manner with the taxation systems of their respective commonwealths or municipalities. Some are college or university professors of economics, government and sociology; some are business men who are vitally interested in the subject of fair and just taxation.

When the first National Tax Conference was called in 1907 by Governor Harris of Ohio, he announced its purposes as follows:

> "To secure an authoritative and an exhaustive discussion of the subject of state and local taxation in all of its details.
>
> "To produce a volume of proceedings containing the best thought of those who, by reason of their special educational training and practical experience, are qualified to speak with authority upon the specific branches of the subject they may elect to discuss.
>
> "To furnish to the members of the legislatures of the several states a concrete, up-to-date statement of the economic and business principles that should be applied in state and local legislation, to be used as a guide for their action when considering proposals to improve the tax laws of their respective states and the administration of the same.
>
> "By this means to secure the application of correct economic and business principles in all tax legislation, and thus develop a high degree of uniformity in the tax laws of the several states.
>
> "By securing uniformity in state tax laws, to eliminate the evil of changes in legal residence and the location of business undertakings induced by differences in state tax laws, and to create conditions of high value in aid of the effective and economical management of the financial affairs of all state and local governments."

This general plan and purpose of the National Tax Association, which grew out of that first conference, has never been changed and it is the same today that it was in the beginning.

In keeping with this idea, the program of the conference contained the names of many of the most prominent of the taxation experts, who discussed subjects of their own choosing.

The conference was called to order by the president, Mr. S. T. Howe, of Kansas, who introduced the Hon. Lauson Purdy of New York as temporary chairman.

The address of welcome was delivered by the Attorney General of Indiana, E. B. Stotsenburg. Allen Ripley Foote, of Columbus, Ohio, founder of the association, Charles J. Orbison, former Superior Judge and special counsel for the Indiana State Board of Tax Commissioners, and Samuel T. Howe of Kansas, were the other speakers of the afternoon and evening.

Mr. Foote, after relating the history of the association, discussed the tax subject in general. Among other things he said:

> "Municipal, state and federal governments must thoroughly learn the lesson that nothing is so mobile as the instruments of

> commercial capital and credits; that business enterprises are easily moved; that no municipality, state or nation can improperly or unjustly tax business capital, business enterprises and the instruments of credit, without suffering loss, because business capital and business enterprises will leave the jurisdiction of an antagonistic government.
>
> "Municipal, state and federal governments will learn by the teachings of experience, if they refuse to learn by the teachings of reason, that they can not hold business capital and business enterprises subject to their jurisdiction if they do not exercise their powers of taxation and regulation wisely."

Mr. Foote outlined what he designated as an ideal system of assessment and administration of tax laws. He said:

> "The growth in taxation, municipal, state and federal, during the ten years covered by this history, is a portentous danger signal. The tendency to increase the objects for which money arbitrarily taken from taxpayers may be expended, and the lack of efficiency in the administration of government affairs, must be checked or the ability to pay will be exhausted."

After giving statistics of revenues, debts and taxation, Mr. Foote said:

> "I have reached one conclusion as a result of my years of study and observation of taxation theories, laws and administration, which I believe will appeal with convincing force to every one who has given consideration to such subjects. It is this:
>
> "The greatest obstruction to the improvement of tax laws, and of their administration, is found in the exercise of the legislative power, and the power of appointment by politicians who are governed by considerations of party expediency, or of sectional or personal benefit, rather than by considerations of social and economic justice or administrative economy and efficiency.
>
> "No experience in life is more discouraging to a conscientious worker for the betterment of taxation systems, the improvement of tax laws, and of economic efficiency in their administration, than the manner in which taxation measures, drafted with the utmost care, embodying the best thought of science and the ripe teachings of experience, are discussed, discarded or amended without intelligence or an understanding of their true value, by politicians exercising legislative power, animated by a narrow, vicious or crafty purpose to serve their personal interests, or the interest of their section, or to strengthen the hold of their party upon political power.
>
> "One other experience is a close second to this and is almost equally harmful to the best interests of the taxpayer. This experience comes when success has been achieved in securing the enactment by a legislature of a reasonably good measure, only to have it vetoed for political reasons; or, if approved and made law, only to have its efficient administration rendered impossible by the

> appointment of inexperienced and incompetent officers or agents charged with the duties of its administration.
>
> "Legislative or executive action swayed by considerations of a personal, sectional or party advantage is the real cause of the injustice or inefficiency found in our system of taxation, in our tax laws and in their administration. This cause will last as long as the indifference of taxpayers and their shirking of political duties will permit it to live.
>
> "Adequate support for correct educational work for the right guidance of his own action and the action of all other voters, is the price the taxpayer must pay for freedom from unjust and unnecessary tax burdens. Failure to pay this price now will compel them to continue to suffer from the evils of which they complain. Self-condemned, they must pay the penalty for their own neglect of their social and political duties."

Mr. Foote declared that the office of assessor should be a permanent one and well paid, with the purpose of making the office of assessor a profession. He also said that the office of state tax commissioner should be permanent and well paid, and that the commission should have the power and be required to appoint its own deputies, agents and assistants, and to remove them; and to appraise all property owned and operated as an undivided unit extending beyond county limits. He advocated the collection of county taxes by the auditor, and the collection of taxes levied by the state board, by the auditor of state, or as in California, by the State Controller.

According to President Samuel T. Howe, the Democratic party, known in the past for its opposition to centralization of power, has reversed its attitude. Mr. Howe added, however, that he did not mean especially to criticize the present administration, because during preceding administrations there were plenty of "big stick" precedents. He declared:

> "Most certainly far-reaching laws have been enacted by congress for which there was little, if any, public demand. Political expediency seems to have been the sole incentive to their enactment."

Continuing he said:

> "The federal government possesses today more power of taxation than do the states. and yet, those in control are reaching out and providing for the taking of federal revenue from sources which the organized best thought of the country a few years ago solemnly resolved ought to be reserved to the states.
>
> "In other fields than those pointed out there has been exhibited the tendency of the federal government gradually to assume power unnecessarily and which for the real interest of the people of the several states might well have been left to the state.
>
> "Another indication of the tendency to centralize power is in the rapidly increasing changes from the old form of municipal government to the modern commission form whereby a large degree of centralization of municipal management has resulted.

"It is, of course, to be admitted that the conditions which have permitted what may be properly called arbitrary legislation are the outgrowth of a gradual development in that direction; and what the culmination may be, unless the tendency to enact uncalled for and unnecessary legislation on the part of centralized power is in some measure controlled, is matter for grave consideration.

"There seems almost always to accompany the possession of power an inclination to use it to the utmost. The desire to dominate in the affairs of life and to direct social activity is in and of itself unobjectionable, but when its fruitage is the arbitrary enactment of laws unsought by the people, then there is need for checks and balances to avoid revolutionary movements.

"It will hardly be denied that the greatest inducement to the enactment of certain laws arises from the fact that those in governmental control deem the laws to be politically expedient.

"The fancied desires of the electorate are seemingly more potent with those in control than is the advice of scientific investigators whose conclusions are drawn from world-wide experience through all the ages.

"Possibly this political incentive will continue largely to dominate in legislation, but the bad economic effects of some laws that have sprung from this incentive have been many times so clearly apparent as to justify an organized effort to have the demands of the electorate based upon the facts of experience.

"Not infrequently law is enacted for which there is little, if any, public demand. This class of legislation will usually be the product of strongly centralized governments where the exercise of the power is lodged in few hands and is widely removed from control by the people.

"That management of many distinctly separated social activities, both public and private, is rapidly drifting to a central control is common knowledge.

"Individual initiative is not the force in world development that it was a few decades back; slowly but steadily it is disappearing before the modern centralizing forces.

"The vast railroad mileage of the country is largely owned by only a few great corporations and competition among carriers has practically ceased, and among these also there is central management of operation in a considerable degree.

"Combinations of capital have taken over nearly all the means of production and the control of production along many lines is largely centralized.

"Through unions of one kind or another the workers of the country, laborers in all lines of effort, are rapidly coming under the control of the heads of organizations, whose policies are dictated and directed by only a few persons.

"Parallel to this common tendency in the industrial and commercial fields is the movement that is rapidly centralizing the exercise of governmental power.

"Perhaps the most important example of the kind is the large assumption of power by the federal government, which has occurred within the past quarter of a century, and is likely to be continued in increasing degree unless a countervailing movement is started.

> "In keeping with this general tendency to centralize the control of civic functions is the proposition now advocated by a not inconsiderable number of citizens to change from bicameral system of legislation to that of the single legislative body.
>
> "The curious thing in connection with the centralizing movement is that it proceeds in face of a present strenuous demand for a freer democracy; a demand, perhaps, never before so insistent, and naturally the conclusion results that the demand of the people for decentralization of the control of public and private social activities is not supported by an organization of the citizens of the country in sufficient numbers and powerful enough to make a compliance with their demand a matter of political expediency."

One whole session of the conference was given over to the state of Indiana, and was addressed by Judge Orbison on "The Township Assessor"; Professor Rawles on "The Income Tax as a Measure of Relief for Indiana"; and former Tax Commissioner Sims on "Divorceing the Assessor from Politics."

Judge Orbison declared that the greatest impediment to efficiency in taxation in Indiana was the present method of selecting assessors by township and that the township assessor under the present laws in many states was an impediment.

He said further:

> "What taxing power needs today is more power and less restraint—more efficiency and less politics—more honesty and less pull, and what the people need to realize is the utility of taxation, and that as they are just and honest in their obligations to the state, so will their government be strengthened and their living be made more secure.
>
> "The township assessor as we find him in most states today is an impediment. While other departments of the taxing power have grown and developed, the township assessor has in the main stood still.
>
> "And how could it be otherwise? I doubt very much that if many township assessors ever saw inside of a township assessor's office before the morning they walked in to take charge of one of the largest businesses in the world, that of the valuation of the public property. He will not assess property at its true cash value, for he is expecting further favors from the public. He is to conduct his office so that he will get the most out of it for himself, curry popular favor by lessening the burden on the taxpayer and intrench the party in power.
>
> "I have but one general proposition to offer, and that is to take the township assessor out of politics and devise some plan by which competent, trained and unbiased men may be put in charge of this business of assessing people's property and then keep them there so long as they may live up to the requirements of the office—and that means to remove them from the realm of elective office.

> "The township assessor as he is, is going. The township assessor as he will be, is coming. Look at him as he approaches in the distance—educated for the job, trained for service, honest in his purposes, unbiased in his judgment, freed from political coils, willing, ready and able to devote his life and talents to the bringing of equity, justice and fairness into the administration of our tax laws. Let us hasten his coming.

Mr. Sims dealt particularly with the assessor and his duties in Indiana.

> "The first essential," Mr. Sims said, "is to pass a practical and efficient law as to taxation, other than the administrative features, for it would seem quite as much, or rather very much more, the occasion of most of the difficulties rather than the perverseness or weakness of the assessor.
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> "The often suggested method of his appointment by the Governor, by some state commission or central authority, would result sooner or later in wedding him to politics rather than obtaining a divorce. Nothing is more characteristic of politics, nor a greater necessity to a successful machine, than patronage. This is a foundation rock, and to wield such tremendous power, both as to appointments as well as personal control of the administration of the taxing system, which would follow of necessity, would not be long overlooked by the bright and designing statesman.
>
> "Much, too, has been urged in favor of the plan of appointing assessors under a civil service system. While this commends itself at once as ideal, yet it is a serious question as to whether the standard of state governments and public opinion locally would either adopt or sustain such an arrangement. If this theory could be executed and supported it would come the nearest to solving the difficulty, but it is extremely doubtful. I would not have you gather any impression that I am opposed to this solution—quite the contrary. But I doubt the feasibility of its adoption.
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> "Moveover, local communities, as well as individuals, would probably strongly resent both the surrender of this power to elect their own assessor as well as the stranger coming in and invoicing their property. There is a strong aversion especially to the latter method.
>
> "If first a workable tax law is adopted a state taxing board or commission should be created large enough and with ample power over both the official acts and tenure of office of the local assessor. It should also have full jurisdiction to review or change his assessments upon its own motion, together with such other power as would give them full power of supervision and enforcement of their requirements. Let the local assessor be under their direct observation and direction and allow him to hold his place, if competent, for such a length of term as may make for the best efficiency. The state board or commission should be nonpartisan in its organization.
>
> "The key to the whole situation is in having a good law and a competent state board. With these your assessor would render

> service commensurate with his responsibility, and public opinion, so essential in the enforcement of law, would be strengthened and sustained.
>
> "And last, but not least, pay this much-abused official sufficiently."

Professor Rawles, dean of the University of Indiana, outlined the provisions of a proposed income tax, fashioned along lines similar to the Wisconsin law. Under the proposed plan, Mr. Rawles said, a tax would be levied against the net income received by residents of the state "from all sources within or without the state," except those incomes specifically exempted. A proposed schedule was outlined by Mr. Rawles as suggestive of what might be the proper taxable rate on incomes ranging from $1,000 a year to $14,000 a year. He proposed that for the first annual income of $1,000 a tax of one-half of 1 per cent be levied, with that assessment gradually increased up to the fourteenth $1,000 annually, which, he proposed, should be taxed at the rate of 6 per cent. The 6 per cent should apply to all incomes more than $14,000, he said.

All corporations, Mr. Rawles suggested, should be taxed at the rate of 3 per cent. These rates, he said, are similar to those found in the income tax law of Wisconsin.

Mr. Rawles said the income tax assessed on individuals and firms in Wisconsin in 1914 amounted to $1,423,914, which was equivalent to 61 cents per capita, counting the entire population of the state. He added that the per capita wealth of Indiana in 1912 was about 1.5 per cent greater than that of Wisconsin. Estimating the population of Indiana at 3,000,000, the state of Indiana should receive about $1,850,000 from the tax on individuals and firms.

Mr. Rawles pointed out that undoubtedly objections will be made to the adoption of the income tax system in Indiana on the theory that such a law would be unconstitutional. He said he would not undertake to discuss the constitutionality of the system, but pointed out that the constitution of 1816 did not confer taxing powers on the general assembly, yet that body proceeded to enact taxing laws. The present constitution levies taxes on foreign insurance companies and on inheritances, he said, and it should have the power to levy assessments on incomes.

Mr. Haugen, president of the Wisconsin Tax Commission, in his address, came out strongly in opposition to the federal inheritance tax, saying that this kind of tax belonged rightfully to the states and not to the federal government. He said that even if the federal government was obliged to resort to an inheritance tax, it should be levied only as a matter of relief. He said further:

> "The states today need more revenue than they did ten years ago. We know that public expenditures have increased beyond all

expectation and in this progressive age that it would be folly to expect that taxes would decrease. The tendency is all the other way universally, so the property tax rate increases, or if the rate does not increase, the values do.

''The inheritance tax has been adopted in nearly all the states. It is a simple and easy method to obtain revenue in a manner not particularly burdensome to the taxpayer, its administration fits well into our state governmental machinery, while it does not adapt itself to federal laws.

''Complaint is heard everywhere today of high taxes; not federal taxes, but state and local property taxes. There is no complaint of the inheritance tax as administered in the states.

''There is entirely a question of policy. There can be no great underlying principle involved. State and local expenditures are bound to increase as long as modern development continues. The public demands more and better public facilities in every respect; better schools, better highways and better sanitary conditions.

''We are looking after the welfare of the citizen, both physically and mentally, to a degree not thought of a generation ago. All these activities cost money and the expenses are defrayed by the states and local communities.

''The federal activities occupy a wider and larger domain. They do not come down to the individual citizen as does the state and local government. The present apparent exigency of the federal treasury will, in all probability, disappear as soon as normal world conditions are restored. It is neither wise nor in the public interest that revenues properly available for local administrative purposes should be diverted to the larger field, where they can be more readily supplied from other sources.

''The report of the committee appointed two years ago to investigate and consider the subject of the federal income tax was read by Alfred E. Holcombe, treasurer of the association and member of the committee. Mr. Holcombe is assistant secretary of the American Telegraph and Telephone Company, New York. The committee recited a history of its efforts to obtain numerous amendments to the federal income tax law, and pointed out a number that it had succeeded in inducing the congress to incorporate into the law. One recommendation with which the committee had been successful was pointed out as being of special importance. It read as follows:

'' 'Individuals should be permitted to deduct all losses, including a reasonable allowance for depreciation incurred in the business, trade or profession in which they are engaged, and including also losses of property used for investment or speculative purposes where the gain, if any, would be subject to tax.'

''It was pointed out that under the amendment based on this recommendation, if a man takes a 'flyer' in stocks and loses, he may, in making his income tax return, deduct the amount of his losses.''

Tuesday morning the following subjects were to be discussed at the first round table session: ''Selection and Tenure of Local Assessors'';

"Methods of Making the State Equalization"; "Composition of the Equalization Board, Whether Appointive or ex officio"; "Increase of Local and State Taxes"; "Limit of Levy Laws." But the conference never got beyond the discussion of the first subject. Many of the delegates spoke and there was a wide diversity of opinion. After listening for some two hours or more, it was my pleasure and pride to state to the conference the very efficient and happy condition of affairs as to taxing conditions here in California. I was forced to the same conclusion which I reached after attending the conference in Buffalo in 1913, and as stated in my report to this board on my return, and that is, that our local system under the county assessors is far more effective than it is in any of the Eastern States. As I stated then, let me repeat, that here the office of assessor is one of dignity and esteem and the assessor regards his work with pride.

Again, I had the pleasure of telling them that the assessors of California were paid as high as $8,000 per annum, and that in my own county, Alameda, the assessor received $7,000. These statements caused no little surprise.

A resolution was presented to the conference to the effect that all assessors should be appointed and was referred to the resolutions committee, of which I was a member and had the good fortune to be named by the chairman on the subcommittee. Needless to say, I opposed the resolution, as did others on the committee, and it was not reported back to the conference.

While we are not perfect, and I believe that many improvements can be made in this state, yet after attending four conferences of the National Tax Association and after visiting many states, I have been unable to find any system anywhere that I could recommend as an improvement over our own. California is surely in the vanguard of any state in more ways than one.

At the fifth session, at which Mr. Andrews of Massachusetts presided, the subjects discussed were: "National and State Income Taxation"; "National and State Inheritance Taxation," and "The New Federal Inheritance Tax."

Mr. Frank Zoller, of New York, claimed that changes in tax laws were very difficult to obtain, saying that the average legislator does not study tax laws from an economic and scientific standpoint. He showed the working of the normal and subtax on stockholders of corporations and companies.

He further said:

> "If the makers of tax legislation discriminate against a corporation they discriminate against a stockholder, for it is upon him that the burden finally falls. Nothing is gained when legislators attempt to bring into the tax law something to connect some

> other thing which has nothing to do with taxation. Another way by which corporations suffer is that there is no provision made in the deductions possible for loss by adolescence, or growth into bigger things. I will illustrate by an example which was brought to my mind. A certain railroad had a large rolling stock, especially of passenger equipment. The passenger cars were practically new and the steel car came into vogue. The patrons demanded steel cars and other pressure was brought to bear to make the company change to the steel car. The company did, and as the result the wooden cars, though new, are on the scrap heap and the company is being taxed for them. This, unfortunately, does not come under the classification of loss by wear and tear which is subject to reduction.''

Mr. Zoller also said that he was in favor of a state income tax, and that the time was coming when all the states would resort to an income tax, and that he did not believe they would ever repeal it. He stated further that when income taxes became general there should be no discrimination between those who got their incomes from corporations and those who got them from other sources.

Judge Oscar Leser, member of the Tax Commission of Maryland, claimed in an address that the boards of equalization were too large and cumbersome to discharge the duties required. He declared the method of selecting boards in practically all the states was bad.

Several delegates from Western states united in claiming that, from their observations, their boards were bad. One delegate from New Mexico declared that the reason the New Mexico board was not doing the work it should was because the legislators who provided for the board did not intend for it to be efficient. The New Mexico board has only ten days each year in which to do its work. Most of the delegates agreed that of all the equalization boards in the country that of Wisconsin was perhaps the best, followed closely by those of New York, Indiana, Ohio and Iowa.

At the session of the round-table, presided over by Mr. Andrews, I reported progress in California as follows:

''This is the sixth successive fiscal year in which California has had no general ad valorem tax for state purposes.

''The publications of this association contain numerous records of the history of the achievement by California at one stride in 1910 of separation of state from local taxation and of what has transpired since. The first reference is found in the address by Prof. Carl C. Plehn on the 'Taxation of Public Service Corporations' given at the very first conference held at Columbus, Ohio, 1907.

''In 1911 at Richmond, after the adoption of his plan by the people of the state, Professor Plehn rendered a report on the inauguration in 1910 of the new system. At the next conference held in Des Moines, Iowa, in 1912, the late A. B. Nye, then State Controller, and chairman of the State Board of Equalization, rendered a further report, carrying the story down to that date. Again, in Denver in 1914, there was an address by Professor Plehn dealing this time with the more difficult problems which had arisen in the administration of the system; lastly, in San Francisco in 1915, some of the labor phases and the now pending measures were discussed at the round-table.

"The salient features of the system are so well known that only a brief summary is necessary. The essential parts of the California system are, that all public utilities, except water companies, all banks and insurance companies, and all franchises are taxed solely for state purposes, with the exception of their nonoperative property. This has well been called a system of segregation, not of separation. In addition to these taxes, the state has the inheritance tax, the automobile and a few other license taxes, certain fees and other miscellaneous income.

"In 1915 the people repealed by referendum the old poll tax which has been part of the common school fund, and thus was thrown an additional strain of $800,000 a year on the state system.

"The taxes on the public utilities are based on gross receipts; those on banks on the stock, on insurance companies on the premiums, and on franchises they are ad valorem, the last being the only tax involving a valuation or assessment.

"The revenues of the state are a little over one-fourth of all the public moneys raised in California. A little over three-fourths of all the state's revenues are from the taxes on the segregated properties.

"The segregated revenues for the six years are:

1911	$10,454,215 00
1912	10,922,405 00
1913	12,971,541 00
1914	13,609,663 00
1915	15,396,797 00
1916	15,678,218 00

"The increase in six years is over five millions in nearly 50 per cent. This increase is almost exactly the same as the increase in local taxes during the same period.

"The increase in state revenues has not all been due to the growth of the gross receipts of the taxed companies alone. Twice, once in 1913 and again in 1915, the legislature has raised the rates.

"These raises were made on the basis of a combination of two theories more or less contradictory one of the other. One theory, held by a relatively small number of the legislators, was that the segregated properties should pay all the state's expenses regardless of whether the resulting burden would be equal to, greater than or less than the burden on those classes of taxpayers who support the county and city governments. The other theory was that the public utilities should bear, as nearly as may be, the same burden as is borne by the average taxpayer, not taxed for state purposes.

"The latter theory has been the basis of three investigations, one to be found in the special report of the State Board of Equalization in 1912, the other unpublished made by the same board in 1914, and the third, now in progress, under the new State Tax Commission. In each of these investigations the endeavor has been to get at the average burden of taxation throughout the state by arriving at the true value of property assessed and the ratio of taxes thereto, and to figure out what ratio, on the average, applied to the gross receipts of the corporations taxed for state purposes would result in taxes equal to the same ratio of the 'stock and bond' value of the corporations. These investigations, too complex to go into here, will be found fully explained in the reports referred to.

"It might be inferred from the success of the new system as a revenue getter and from the fact that litigation over the new law is almost negligible, that the taxpayers and the people of California ought to be satisfied to let things run on for awhile. But such seems not to be wholly the case. The rapid increase in public expenditures, for things which a progressive people rigorously demand, has thrown a burden on the taxpayers, both state and local, under which they are becoming restive. In the last legislature there were many schemes for a change. There was, moreover, growing dissatisfaction with the inequalities in local assessments. As a result, there was submitted to the people a constitutional amendment providing for a permanent state tax commission, to replace the State Board of Equalization and with supervisory powers over the fifty-eight county assessors, who feared that it meant control rather than cooperation.

"At the same time the legislators created a commission to investigate and report on, every phase of the tax system. The commission has been at work since last February and has already published a 'foreword' intended to stimulate interest and bring out opinions from the taxpayers. This foreword lays emphasis mainly on the need for better administration of the tax laws, and for giving the assessors more power and especially more facilities for doing their work properly. It is too early to forecast what the commission will recommend, but its report will contain some very interesting data as to the working of the present tax system in all its phases.

"One thing we are much concerned about in California is the threatened absorption by the federal government of the inheritance tax. This yields us $2,500,000 a year of state revenue, an eighth of the whole, and its loss would be a serious blow. Moreover, we believe we have as nearly perfect an administration of that law as possible, and fear that the federal administration would not be nearly as efficient. As the equality of an inheritance tax depends primarily on the administration, this seems to us another loss.

"The single taxers have again, now for the third time, put a home rule constitutional amendment before the people by initiative petitions, and this too will have to be voted on this fall.

"Although the people are not very deeply stirred up or excited over tax matters, yet there are questions pending, 'something doing' in the field all the time."

Many other papers were read, but none that brought out any further discussion. The one paper above all that I wanted to hear I missed, for the reason that they changed it from Thursday evening to Thursday morning, after I had left to pay my respects to Mr. Fairbanks. While I enjoyed very much the visit and luncheon with Mr. Fairbanks, I did not want to miss Professor Bullock's paper. Yet we will get that in the report of the conference.

I have quoted at length for the reason that I wanted this board to get what was said just as it was said, and so that you may understand that there was an unanimity of opinion that sweeping and important changes should be made in the present day system of raising money by taxation. In many of the informal talks there was intense criticism of the fact that taxation, and the administration of tax laws, is largely a matter of politics; and that the people should take a greater individual interest in the subject was the opinion of all.

Altogether I had a very interesting trip, for which let me again thank you.

STATE CONTROL OF BOND ISSUES TO SUPPLEMENT STATE CONTROL OF TAX LEVIES.*

By George G. Tunell, of Chicago.

Gentlemen of the Taxpayers' Association of New Mexico:

Your director asked me to address you on the subject of State Control of Bond Issues to supplement the already existing State Control of Tax Levies. The state controls tax levies to prevent undue and disproportionate amounts of the income of its citizens being taken from them for public purposes.

The legislature was of the opinion that it should set limits on the amount of money that could be taken by the local tax levying authorities from the taxpayers to meet regular and ordinary expenditures and that it should set up the machinery for passing on emergency requirements, and passed the necessary laws. The legislature assumed that as all the people of the state were closely bound together in their economic activities and as the legislature represented all the people, that it was a better judge of the amount of money that should be taken from the taxpayers than the local taxing officials, especially as the latter often act without much consideration and sometimes act in response to some temporary excitement of the community.

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*Read by Mr. A. A. De Camp.

Some people hold the view that there should be no restrictions in the constitution or in the laws on the tax levying authorities, but I can see no fundamental objection to such restrictions, in view of the protection of person and property guaranteed in other directions by the constitution and laws of the state. In the broadest sense the limitations set up in New Mexico are in line with the idea now gaining acceptance that budget making should *start* with the consideration and determination of how much of the income of the people should be taken for public purposes.

There is one other aspect of this subject about which I shall say a few words before taking up the principal phase of my subject. During the past few years a craze for spending money has spread over the land, with the result that taxes and public debts have increased by leaps and bounds and have now reached alarming totals in many places. This country has seen nothing like the present extravagance since the middle of the last century, when the craze that swept over the land for the construction of railroads, canals, highroads and other public improvements left many of the states bankrupt and with bonded indebtedness so large that repudiation could not be avoided.

Men who have reaped a rich harvest out of the money that has been spent for public improvements are urging the people directly, and I am told in some cases by paid agents, to new and further extravagances. They say to the people—why wait for good roads and other things you would like to have? Why not issue bonds for these ''permanent improvements'' and begin to enjoy them at once and incidentally make the next generation pay part of the cost? First of all, I would like to express the opinion that there are no permanent improvements. For example, the best road ever built will soon go to pieces if substantial sums are not spent on keeping it up. In the next place, it should always be remembered by the taxpayer that in voting for a bond issue he is voting to place a first mortgage on his property. And finally I would ask what opinion would you hold of the business sense of a man who would mortgage all his property to build a handsome home that cost far more than his present income justified, all on the theory that it was a permanent acquisition and that it would cost him nothing to begin to enjoy it at once?

You are being told that the surest way to attract Eastern people to settle in your communities is by spending money for public improvements. I wish to say that in my opinion there is no surer way of keeping them away from your state than by spending public money extravagantly and unwisely and by running deeply into debt for things you could very well do without. A big bonded debt and a high tax rate will scare more people that are desirable away from your state than a costly state pleasure road will ever attract. No community, just as no individual, ever prospered by extravagant habits.

In these days of increasing public expenditures, every new proposal to issue bonds should be carefully considered by the taxpayers. The purpose for which it is planned to spend the money may be a worthy one, but if it is beyond the present wealth of the community, then it is an unwise one. In a state where there is little wealth and where the vast majority of the people must struggle hard to get the necessaries of life, bond issues for pleasure and ornamental purposes should not be popular.

The community, just like the wise family, should endeavor through careful consideration and planning, so to apportion and expend its income as to get the biggest results for its money. If this plan is followed, the necessaries will be provided for before the luxuries receive any consideration. The community, like the wise family, should try to adopt a well-rounded fiscal policy. This, of course, simply means that too much of its income will not be spent in one direction and too little in another.

Washington Irving, in his "Knickerbocker's History of New York," so well sets forth what I mean by unbalanced expenditures in describing the housebuilding and other operations of an over-ambitious farmer that I shall quote briefly from him:

> "But it is not the nature of this most indefatigable of speculators to rest content with any state of sublunary enjoyment; improvement is his darling passion; and having thus improved his lands, the next care is to provide a mansion worthy the residence of a landholder. A huge palace of pine boards immediately springs up in the midst of the wilderness, large enough for a parish church, and furnished with windows of all dimensions, but so rickety and flimsy withal, that every blast gives it a fit of the ague.
>
> "By the time the outside of this mighty air-castle is completed, either the funds or the zeal of our adventurer is exhausted, so that he barely manages to furnish one room within, where the whole family burrow together, while the rest of the house is devoted to the curing of pumpkins, or storing of carrots and potatoes, and is decorated with fanciful festoons of dried apples and peaches. The outside remaining unpainted, grows venerably black with time; the family wardrobe is laid under contribution for old hats, petticoats, and breeches, to stuff into the broken windows, while the four winds of heaven keep up a whistling and howling about this aerial palace and play as many unruly gambols as they did of yore in the cave of old Æolus.
>
> "The humble log hut, which whilom nestled this improving family snugly within its narrow but comfortable walls, stands hard by, in ignominious contrast, degraded into a cow-house or pig-sty; and the whole scene reminds one forcibly of a fable, which I am surprised has never been recorded, of an aspiring snail, who abandoned his humble habitation, which he had long filled with great respectability, to crawl into the empty shell of a lobster, where he would no doubt have resided with great style and splendor, the envy and the hate of all the painstaking snails in the neighborhood, had he not perished with cold in one corner of his stupendous mansion."

I have now reached the principal phase of my subject. Your director asked me to discuss the question as to whether the state should exercise a control over bond issues, and I suppose he includes notes and certificates of indebtedness. There are good reasons for the control of tax levies, but the case is doubly strong for the control of bond issues.

If the state does not control the issue of bonds, its control of tax levies can be set at naught. As a matter of fact, the attempt to control tax levies may prove costly to the taxpayers unless it is supplemented by control of bond issues and of the other forms of indebtedness. For example, a county board, extravagantly inclined, on finding itself checked by the limitation on the tax levy, might turn to a bond issue to get money. This, of course, is the most expensive way to obtain funds, and the fact that it puts off the evil day of payment often leads to greater expenditure than was originally contemplated. Money obtained by sale of bonds is too often regarded as "easy money."

There is another reason why the state should control the issue of bonds. People in the big money centers think by states, and it should not be in the power of one community to impair the credit of the whole state. By the overissue of bonds a community may do incalculable injury to every other community in the state. This tremendous power to harm calls for state control.

There is another reason for state control, and if there were no other it would be sufficient in itself. State control, wisely exercised, would save the people of this state large sums of money annually. If it became known in the great money centers of this country that the state of New Mexico saw to it that none of its counties, cities, towns and other municipal subdivisions put out bonds in excessive amounts, if it became known that the state provided the forms and guarded every step in the issue of the bonds so that no question could arise as to the validity of the obligation created by the bond, and if it became known that the state saw to it that taxes were levied to pay the interest and that the interest was paid when due, and that the bonds were serial bonds or that sinking funds would be provided and kept inviolate, we would soon see four (4) per cent bonds of the counties, cities, towns and other municipal subdivisions of the state of New Mexico selling at par or better.

I wish I had the power to drive these facts home:

> (1) That the borrower pays dearly for any doubt existing in the mind of the lender as to ability to repay a loan;
>
> (2) That getting up new forms for every new bond issue, and having them approved by attorneys of standing, is very expensive and wasteful;
>
> (3) That the borrower pays a big price for any doubt that finds lodgment in the mind of the lender as to whether his contract is valid and enforceable, and
>
> (4) That the borrower pays for the fear of the lender that his interest will not be paid promptly and that the taxes collected for the sinking fund to retire his bonds at maturity will not be sacredly kept for that purpose.

Possibly some of the points to which I have called attention may not appear to be of much importance, but such is not the case. A few days ago, while in New York, I was told by an officer of the largest bank in that city that New Mexico bonds were hard to sell in that market, even if their interest rates were high, because the interest was often late in arriving. He said a shower might keep the county treasurer at home even on the last day for sending out the interest money. Only a few days ago I learned of the payment of $900 by a school district for legal services in connection with a bond issue of $25,000. Fees of this size make big inroads into the money received for bonds and materially reduce the net proceeds.

Everything possible should be done to make New Mexico bonds pass readily from hand to hand. Anything that will give them currency will enhance their value. The care taken by the Massachusetts Bureau of Statistics to insure the investor against forgery and to establish the legality of the town notes of that state has been officially recognized by the Federal Reserve Board, which has approved Massachusetts town notes, duly certified by the director of the Bureau of Statistics, as proper investments for federal reserve banks.

By chapter 84 of the Massachusetts General Acts of 1915 it was provided that the certification of town and district notes by the director of the Bureau of Statistics under the law should be deemed prima facie evidence of the liability of the town or district issuing the same for the payment of the debt.

By chapter 285 of the Massachusetts General Acts of 1915 the director of the bureau was authorized to place on notes submitted to him for certification such denominations as will show the purpose for which the same are issued and as may be required by law to appear thereon.

Great progress has been made in New Mexico in tax matters. I hope the next legislature will enact a law that will put New Mexico in the lead of all the states in that control of the issue of funded indebtedness that brings bidders in the field and results in sales at advantageous terms. There is no man in the land so well fitted to draw up such a law as the director of this association, and in order that the legislature may have something to work on as soon as it convenes, I trust that the executive committee, before it leaves Albuquerque, will aks the director to give this subject his early attention.

September 28, 1916.

BEST METHODS OF TAXATION.

By A. A. De Camp, Tax Agent.

Mr. Weaver, early in October, wrote: "I will appreciate it, if you will favor us with a paper on 'The Best Methods of Taxation'." Certainly a request to answer which might be considered from a negative standpoint. Not being on the public pay roll, and having sought for ideas away from home, my answer might be appreciated. However, their value could be compared to an effort to establish value of an attorney's services. Years ago, in my county, in Judge H. K. S. O'Melveny's court, Capt. Haley and J. G. Howard were partners, but did separate practice. Haley put Howard on the witness stand:

Q. "Mr. Howard, do you know the value of service rendered by Mr. Haley?"

A. "I do."

Q. "What is it?"

Q. To the Court: "Must I answer?"

R. By the Court: "The question is proper."

A. "Nothing."

Howard did not share the fee.

My paper will give my opinion. It is mainly expressions on the broad subject in the language of those of experience in the Tax World with my suggestions of betterments.

The National Tax Association means to the county assessors, if not definite, to suggest, the study of a common effort to establish simplicity and economical production of the necessary tax to modestly sustain the government.

Thanks are due this body, that made it possible for me late in life to meet and discuss ideas (that bring us here today) with such grand men as Hon. Allen R. Foote, Samuel T. Howe, Alfred E. Holcomb, Oscar Leser, Otey B. Mitchell, J. S. Edwards, Zenas W. Bliss, Lawson Purdy, Frederick Van Nuys, E. R. A. Seligman, A. E. James, G. G. Tunell, E. B. Howard and others of like character.

The federal government should provide a form for obtaining the tax; the states and counties supply the machinery for detail. The government collects as it does the income, and distributes to the subordinate political subdivisions. This is not centralization, but unison of effort for a common purpose, and has been suggested in congress. See Hon. Chas. F. Curry's address July 10, 1916.

The National Tax Association is considering a Lobby to provide cooperation of Tax Bodies of the States with Government. Take notice—it will dispense with the services of thousands of people over the country—especially in our state. An outsider, in a visit here in 1914, said our Assessor's office was conducted as though it was a Criminal Detective Department, and every man an expert sleuth developing the third degree on a murder suspect. Team work is demanded; common efforts made by Assessors, Collectors, Auditors and Supervisors; and, an observance by tax men of Mr. Foote's paper, as per pages 19 and 20 in his Report at Indianapolis. Sentiment on school affairs wiped out, and exemptions done away with. Schools should be managed by County Officers—eliminating District Trustees. See New Mexico's Tax Levies of 1915 saving that state 13 per cent—doing away with complicated rates. See Los Angeles and San Bernardino counties; the latter attempting economy. The results or values in toto of personal property to the local Assessor saving untold amounts. The results extend to every associated department. The general fund should cover more. The tax people, if treated on business lines, ask no detail. A private utility, state-wide, does more (and similar work) with two persons than any twenty employees in any assessor's office from Modoc to San Diego. The Tax Commission published in August, 1916, a pamphlet. We all know what it cost; and yet there is ability in this room that was, and is possessed of all of this information, and would have furnished it without cost. The same can be said of Los Angeles Joint Appraisal. The suggestions notably call for service of more commissions and more work for existing bodies. A collector insisted to a taxpayer—referring to the conduct of his office "that it was actually the best in existence". In the last three years, I have noticed more idle men trying to justify their holding jobs in our state than in other communities I have visited, and they include Chicago, St. Louis, New York, Washington, D. C., and Cincinnati.

The commission's circular letter of August, 1916, like many others, ask to shift their supposed best opinions on to the public. Cut out county government, or special laws. Let the assessor have the average pay—the best in the country. Let him use the laws we now have. Clean out the dead timber in his office. Demand cooperation with coincidental offices. Don't waste time and money for the real estate men. They will care for themselves. Work against exemptions of all kinds. See report of Hon. Martin Saxe of New York. Sentiment is the ruination of any country. The Civil War has been fought out. The veterans have for years obtained more pay than they ever earned. The church simply shifts the burden to the shoulder of the little fellow. These things increase the free lists; make us violate the constitution by trying to join state and church. Get rid of the idea that we have the best tax system in the land. The tax offices are really the most expensive bits of machinery we are trying to operate. Let us all agree to work for something better. Use a tax levy limit. Curtail your binding and printing bills. Extend your land value limit. Use photography. Apply personal property values in gross over the state. Make their collections cumulative by law, and we are a long ways toward the top of the ladder.

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OF THE

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OF THE

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BIENNIAL REPORT OF THE DEPARTMENT OF ENGINEERING.

INTRODUCTION.

In presenting this, the fifth biennial report of the Department of Engineering, it is deemed proper to invite special attention of the Governor and the legislature to certain matters discussed herein.

Since its organization nine years ago the department has grown and the field of its operations has greatly extended. While in 1908 the department occupied but four rooms in the Capitol Building, it now occupies the entire sixth floor of the Forum Building, a large part of the fifth floor, and several rooms on the eighth floor. Even with all of this floor space it is crowded, having to place two executive offices in one room in several instances. This statement is made merely to indicate the size of the department as a state institution, and to emphasize the recommendations made herein.

1. The employees of the department are of two classes, statutory and nonstatutory. The first class are named by title and their compensation is fixed by the statute and paid from the general appropriation fund. The second class are those appointed by the department from time to time as their services may be required, and frequently are employed for special purposes. In this class are draftsmen, clerks, stenographers, inspectors, etc. Their compensation is charged against the institution or appropriation for the particular work in hand.

Several of these employees, such as the chief draftsman or the chief auditor, for instance, exercise supervision over many others, and it is extremely difficult to segregate their time equitably to the several appropriations.

It is recommended that the following appointments be added to the statutory list of employees:

Assistant State Architect.
Mechanical Engineer.
Structural Engineer.
Electrical Engineer.
Road Engineer.
Two Architectural Draftsmen at $175 per month, each.
Two Architectural Draftsmen at $150 per month, each.
Auditor.
Two Filing Clerks.
Two Clerks and Stenographers.
Blueprint Pressman.
Porter and Messenger.

2. In the article herein discussing irrigation districts it is pointed out that the statute requires the State Engineer to investigate the project of a proposed irrigation district and report upon its feasibility. The law only allows him one month to do it. Frequently there are no data at hand and the investigation must be in the nature of original research to ascertain the reliability of the water supply, the probable cost of dams and ditches, and the adaptability of the lands to irrigation. In many cases it is a physical impossibility to make an investigation in a month that will do justice to either the investigator or the project.

It is recommended that the State Engineer be given time to make the examinations in proportion to the magnitude of the enterprise and in no event should he be restricted to less than ninety days.

3. The Department of Engineering has no special fund from which to pay the costs of making investigations of proposed irrigation districts and the contingent fund provided is only sufficient to meet the regular demands made upon it. It is recommended that the contingent fund be made large enough to cover such investigations with the proviso that when a district shall be organized it reimburse the fund.

4. Before bonds can be issued by a district the plans for proposed work must be submitted to the State Engineer. He may approve the plans or recommend changes, and report his estimates of the cost. The district may accept his recommendations or ignore them entirely. This should not be. As consulting engineer his decision should be binding, and it is recommended that the law be amended so as to make it so.

5. The statute of 1913 provides that when works are being constructed from the proceeds of bonds the secretary of the district shall forward to the State Engineer copies of progress reports of construction. Some districts do not exact progress reports and have no copies to send. The same act (section 54½) provides that the State Engineer may cause to be made an examination of the affairs of any irrigation district and make such report thereon as he may deem advisable. Make report to whom? The statute does not say, nor does it confer authority upon anyone to act in case the examination should disclose that the work is not being done according to the plans, or that faulty works are being constructed and the funds wasted.

It is recommended that the act be so amended that the State Engineer's recommendations shall be binding and that a dereliction on the part of a district be reported to the Governor, who may direct proper proceedings.

6. There is no law now authorizing the consolidation of irrigation districts. Cases exist where two or more districts might be united under one management with benefit to both.

It is recommended that the law be amended to permit of consolidation of districts.

7. The present law authorizes the formation of an irrigation district composed of many tracts of land which may not necessarily be contiguous, but after a district is formed no other lands may be included or annexed unless they are contiguous to the district. Instances are known where desirable lands desire to be annexed, but being separated from the district by undesirable or hostile lands must be excluded.

It is recommended that desirable lands not contiguous to a district be enabled to enter the district.

8. No law exists authorizing an irrigation district to own property outside the state excepting the district embraces more than 500,000 acres. One district of 30,000 acres finds it is necessary to store its water in a reservoir situated just across the line in another state.

It is recommended that chapter 655, 1915, be amended so as to apply to all districts.

9. *In the matter of state supervision of dams.* The statutes of 1915, page 632, direct the Department of Engineering to pass upon all plans, specifications and estimates for the construction of dams. The department submits that to ''pass upon'' plans can be of little use unless changes in faulty plans can be prescribed and penalties enforced for departure from the approved plans. It is not claimed that the department should have police powers, but its findings should be submitted to some state authority having power to enforce police regulations.

It is recommended that it be made unlawful to erect a dam excepting the plans therefor be approved by the Department of Engineering, or to maintain a dam that is found defective or dangerous until measures satisfactory to the department have been taken to make it safe; the department be authorized to keep representatives present during construction or repairs affecting safety. Under the provisions of section 7, Statutes of 1909 (page 656), it is a felony for any member or employee of the department, or any contractor or his agent, to knowingly permit a violation of the provision of a contract on state work, or to have knowledge of such violation and not report it to the department. It is recommended that some such provision be made to apply to all constructions where a failure would endanger life and property.

10. Chapter 68, Statutes of 1881, requires plans of all bridges to be erected over navigable streams to be submitted to the State Engineer, who shall designate the width of draw and the length of spans necessary for the free passage of water. In the discussion herein of the subject, a case is cited of a railroad bridge over a nonnavigable stream which offered so much obstruction to the flood flow as to cause destruction of life and property.

It is recommended that it be made unlawful to erect a bridge over any stream which might cause damage without having the plans and location approved by the Department of Engineering.

11. Under hydroeconomics is discussed matters pertaining to flood control, and the desirability of having all flood control projects approved by the state. Whether a project be submitted to a State Reclamation Board, Flood Control Commission or other body, it is here contended that all engineering service required by the state in connection therewith should be executed by the Department of Engineering.

12. *In the matter of state roads.* The department now maintains more than six hundred miles of state roads in the high mountains, independently of the state highways. With the aid of the motor vehicle fund these roads have been much improved in the last two years, and their improved condition is evidenced by the greatly increased automobile travel over them. There is one of these roads, however, which this department considers of no use as a state road. Reference is had to the Sierra state road, in Sierra County. The projected length is twenty miles, of which fourteen miles were once surveyed and three miles built, extending from Downieville into the mountains. It does not connect any important communities, and would not be a part of any continuous system of state roads if completed. It is a liability and not an asset to the state.

It is recommended that the act creating it be repealed.

13. Attention is invited to the article on Water Resources, and particularly to the discussion of snow measurements in connection with stream measurements. Records of the quantity of water flowing in every important stream on every day of the year are being obtained. They are of immense value in the consideration of all problems of irrigation, navigation, flood control and reclamation.

If the knowledge obtained of the flow of streams was supplemented with a knowledge of the quantity of water held in reserve by the snows within the stream's drainage basin at any time, prediction could be made of the probable flood height to result therefrom, and preparations made accordingly.

When flood control reservoirs shall be built by knowing beforehand how much water is held in the snows, it will be known to a certainty how to manipulate the reservoir gates so as to impound the maximum quantity for irrigation and navigation, without impairing their usefulness for flood storage.

The appropriation for hydrographical work in cooperation with the United States Geological Survey is not sufficient to enable investigations to be made along the lines suggested.

It is therefore recommended that an appropriation of $10,000 be made to enable the department to make measurements and studies of snow storage, and that authority be given to enlist the cooperation of federal agencies and private concerns.

14. The importance of inland navigation is being felt very strongly now since the withdrawal of terminal rates from interior points. The department has given much thought to the subject, and presents a report thereon, the conclusions of which may be briefly summarized as follows:

It is engineeringly feasible to construct tidal canals capable of conveying ocean-going ships to Sacramento and Stockton, at a comparatively low cost.

It is engineeringly feasible to extend those canals several miles further into the interior, with locks.

Ships can be conveyed by canal within a few miles of San Jose.

It is no greater engineering problem to build a lock-canal for ships from the sea to the heart of the city of Los Angeles than it was to build the great Manchester Canal.

It would be no greater an engineering feat to build a barge canal from Red Bluff to Bakersfield than is the one now nearly accomplished of constructing the New York Barge Canal from Albany to Buffalo to accommodate barges carrying two thousand tons. The same distance and same elevations to overcome.

Investigations have not gone far enough to show what the costs of construction or of operation of such canals would be.

That all or any of the above are industrially feasible is not the province of this department to say, but it is urged that the question of cheap transportation is of such great importance to all that it should engage the earnest attention of the legislature to the end that an intensive study be made of the whole subject.

15. In the matter of certain employees of the department, it is desired to call attention to the fact that all maintenance work on state roads and all construction on river improvement is done by day labor. The jobs are short. The road work lasting from April or May to October, the river jobs seldom requiring more than two or three months each, though several may be running at once.

The majority of laborers employed upon these works are transient, and usually there are more applications for work than can be accepted, but an applicant not on the civil service list can not be given employment until that list is exhausted. Much time is lost in sending in requisitions from distant camps to the Civil Service Commission for men, frequently to find none or not enough on the waiting list to fill the requisition, and recourse must be had to temporary authority to employ nonlisted men.

Although the Civil Service Commission has always exerted every effort and given all assistance possible, the inevitable delays are annoying and frequently result in loss.

When the men are obtained, either from the Civil Service or otherwise, they generally will work only a short time. The average duration of employment of that class of labor is only about three weeks and the department fails to see where either the men or the service is benefited by their being under civil service regulations.

It is therefore urged that all transient labor of the department be exempted from the operation of the civil service.

The cordial relations sustained between the department and the various offices of the state government, the several institutions and the many branches of the federal government with which cooperative work has been conducted, has been a source of personal satisfaction and the State Engineer takes this opportunity of acknowledging the many courtesies received at the hands of all with whom dealings have been had.

PART I.

Fifth Biennial Report of the Department of Engineering of the State of California.

The Department of Engineering was created by an act of the legislature approved March 11, 1907, chapter 183, Statutes 1907, and was organized in the May following.

The act creating this department abolished the offices of Commissioner of Public Works, Auditing Board to the Commissioner of Public Works, Department of Highways and State Highway Commissioner, Lake Tahoe Wagon Road Commissioner, and Debris Commissioner, and delegated the performance of their several duties to the Department of Engineering. To the department was also assigned all engineering work for the Board of Harbor Commissioners of San Francisco and the design and construction of buildings and works for all the hospitals, prisons, schools, and other state institutions. It was given authority to cooperate with the Department of the Interior and other departments and bureaus of the national government in making surveys, investigations, etc.

Mr. Nathaniel Ellery was appointed to the position of State Engineer and chief executive officer of the Department of Engineering, and assumed the office May 11, 1907. He was succeeded in office by the appointment of Mr. Wilbur F. McClure, incumbent, February 13, 1912.

The records of the organization of the department and the work accomplished by it from the date of its establishment to November 30, 1914, have been published in the reports issued every two years, and it is the office of this report to review the operations of the department during the biennial period just closing.

Since the department was created, each session of the legislature has enacted laws amending the statutes affecting the work of the department, the most notable of which was to enable it to handle the administration of the State Highways Act, which provided for the construction of an extensive system of state highways. Many of the statutes have added greatly to the functions of the department.

DEPARTMENT OF ENGINEERING.

Under the statutes now in force the Department of Engineering is composed of three bodies: Advisory Board, Consulting Board, and Executive Force. These three bodies are constituted respectively as follows:

THE ADVISORY BOARD.

Governor, ex officio member and chairman.

General Superintendent of State Hospitals, ex officio member.

Chairman of Board of State Harbor Commissioners of San Francisco, ex officio member.

State Engineer, appointed by the Governor, ex officio member.

Three members, appointed by the Governor.

The Advisory Board is the administrative head, and directs the operations of the department through the State Engineer, who is the chief executive officer of the department.

The ex officio members receive no salary as members of the Advisory Board. The three last-named appointed members of the Advisory Board are delegated as a special executive committee of the board to administer the affairs of the state highway bond projects, and bear the title of State Highway Commission. These members are paid salaries.

THE CONSULTING BOARD.

This board is composed of five members appointed by the Governor and serve without compensation. The functions of this board are to act as intermediary between the people desiring public work done on the rivers and the Department of Engineering; receive and consider petitions and make recommendations to the department in regard to proposed work pertaining to drainage, irrigation, and river improvement. This board holds meetings at the call of the State Engineer.

EXECUTIVE FORCE.

State Engineer, Chief Executive Officer.
Two Assistant State Engineers.
State Highway Engineer.
Chief Harbor Engineer.
State Architect.
Architectural Designer.
Secretary.

The foregoing comprises all of the "statutory" employees whose positions were created by statute, and whose salaries are paid from the fund created by the "General Appropriation Act."

The field of operations conducted by the Department of Engineering has grown with such rapidity and to such dimensions that it has been found necessary to create new offices and to employ a much larger force than was contemplated when the department was created.

The universal employment of electricity for lighting, power, communication, and in the hospitals its extensive use in therapy, requires a large force of electricians, and to properly direct their work, the employment of an electrical engineer is necessary.

A vast amount of construction and repair of state property is done directly by the Department of Engineering, entailing the purchase of immense quantities of materials, machinery and apparatus.

To effect economy in this line a purchasing office was necessary, which was maintained under the direction of a [1]Purchasing Agent.

The construction of buildings along modern lines and on the large scale conducted by this department requires the use of immense quantities of cement, stone, bricks, metals, asphalts, oils, paints and all the materials entering into the construction and furnishing of public buildings. To insure that each article should conform to the specifications a testing laboratory was early established and has been constantly employed under charge of a [2]Testing Engineer.

The rapid growth of automobile traffic in the mountains with its insistent demands for a higher grade of road maintenance necessitated the creation of the office of Road Engineer to properly direct the work on the hundreds of miles of state roads traversing the scenic regions of the high Sierras.

The increasing demands for improvement of the navigable rivers of the state entailing continuous effort in bank protection and channel rectification, gives constant employment to a large force under the direction of a river superintendent.

The expenditure of several millions of dollars entrusted to the department requires a considerable force of accountants, directed by an auditor, in whose keeping is also placed the records and archives of the department.

In addition to those enumerated above, the department constantly requires the services of draftsmen, architectural and structural engineers, surveyors and their crews, superintendents, inspectors, and men in many other capacities, down to cooks, waiters, and roustabouts in the road and river construction-camps.

The foregoing constitutes the "nonstatutory force." The compensation of these employees is paid usually from the funds appropriated for the construction upon which they are employed. Frequently this can not be done, and then the employee is paid from the department's "contingent fund."

So many of the nonstatutory positions are permanent in character, and as the incumbents are civil service employees, it is believed better service will result from extending the list of statutory offices. This is a matter that is earnestly commended to the consideration of the coming legislature.

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[1] The duties of this office were taken over by the State Purchasing Department on September 15, 1916.

[2] The office of Testing Engineer was transferred to the State Purchasing Department in July 1, 1916.

DUTIES OF THE DEPARTMENT.

The above list of employments indicates to some extent the varied nature of the department's activities and the extent of the field covered by it. Its duties, as specified by several statutes, are summarized as follows:

To make plans and specifications for all buildings at the various state institutions, to let contracts for and superintend their erection, or, in case satisfactory contracts can not be made, to construct the buildings by day labor. To design and install all heating, lighting, ventilating, refrigerating, water supply, sewerage, and mechanical plants of every nature—whether changes, extensions or original. Survey grounds, lay out walks, drives and roads; provide water supply, irrigation, reclamation, sewer and drainage systems, requiring the design and construction of dams, reservoirs, pipe lines, wells, pumping plants, ditches, sewage treatment and disposal plants and drains.

Design and construct works for the protection of river levees, preservation of navigation and protection from floods.

Conduct research looking to the reclamation of the overflow basins and to effect flood control on the Sacramento and San Joaquin and other rivers of the state.

Studies of the feasibility of navigable canals and canalization of rivers.

Through the engineering force assigned to the Board of Harbor Commissioners, to design and direct the construction of wharves, piers, buildings and their equipment on the water front of San Francisco.

Location, construction, repair and maintenance of state roads, of which there are more than 600 miles in the mountain regions.

Through the Highway Commission, the location and construction is being conducted of the system of highways authorized by the state highway bond acts.

The administration of the Motor Vehicle Act, involving the issue and registry of all licenses for motor vehicles. The issuance of licenses for the operation of motor vehicles was placed in the Department of Engineering by an act approved May 31, 1913. To handle the matters pertaining to this required the erection of a division especially for that purpose, which continued as a part of this department until the creation of a separate Motor Vehicle Department in 1915.

By cooperation with the federal government a topographic survey of the state is being made; daily measurements are made of the water flowing in all the principal and many of the minor streams of the state; studies of possibilities for developments of power in the mountains and irrigation in the plains. Investigation of the quantity of water required for various crops; methods of applying it, waste in the use of water, etc.

This department is required to cooperate with the engineers of the War Department in matters concerning debris control, flood control and aids to navigation.

The State Engineer is required to investigate and pass upon the feasibility of the enterprise before an irrigation district can be organized, and must approve the estimates for a projected bond issue. He is a member of the Irrigation District Bond Commission and is required upon application, to investigate the engineering features of the projects of irrigation and county water works districts, where the latter desire to have their bonds accepted as state securities, and thereafter he supervises the construction of works executed with proceeds of validated bonds.

He is ex officio a member of the State Water Commission, which body has control of all water appropriations and the ascertainment of water rights. He is also a member of the Carey Act Land Board.

The State Engineer is required by law to direct the engineering investigations for the Reclamation Board to determine the proper location and sufficiency of proposed reclamation works, so that they shall conform to the plan for the flood control adopted by the state.

Plans for all bridges to cross navigable streams are required to be approved by the State Engineer before they are permitted to be erected.

The law directs that he shall pass upon the plans, specifications and estimates of all dams constructed in the state.

In addition to the active duties enumerated above, the department conducts an extensive correspondence, answering queries from all over the country seeking information in regard to the extent of drainage, reclamation, irrigation and power developments, and many other lines of progress in the state, and the costs thereof. If the information is at hand or can be obtained it is always furnished. This is done upon the theory that all public offices should be in a measure publicity bureaus, and the dissemination of correct information as to the resources of the state and its advantages is a proper function of all branches of the government.

The department has been called upon by municipalities for advice in regard to sewage disposal; by communities asking for the examination of dams, as to their stability and safety, and specifications to strengthen the same, as well as advice regarding flood protection and stream control in different portions of the state. While these are not duties enjoined by law upon the department, the State Engineer has always responded to such requests and given such assistance in an advisory way as the department was able to furnish, and it is gratifying to know that such aid has been regarded of value by the recipients.

ORGANIZATION.

As previously stated, the department is divided into branches to handle each different kind of work. These branches are termed bureaus. The executive head of each bureau is called the director. He reports directly to the State Engineer.

The bureaus as now established are as follows:

I. General Office Bureau.
II. Bureau of Architecture.
III. Bureau of Economics.
IV. Bureau of Highways.

I. The General Office Bureau conducts the business of the department relating to all other branches, such as keeping the records and archives, accounts, contracts, claims and payments, legislation, janitor and messenger service, etc.

II. The Bureau of Architecture, as its name implies, designs and constructs all state buildings.

III. The Bureau of Economics has charge of all matters pertaining to hydraulics, such as irrigation, stream measurement, flood control, reclamation, drainage, and navigation.

Plans for water supply, for sewerage, irrigation, drainage and reclamation, roads and bridges, topographic surveys of grounds and surveys of land boundaries for all state institutions are entrusted to this bureau.

Supervision of dams and bridges is exercised through this bureau.

This bureau also has charge for the state of cooperative topographic surveys, hydrology and irrigation investigations.

The office of State Roads is also in this bureau. By this is meant the roads owned by the state in the mountain regions as distinguished from the state highways under the Highway Commission.

IV. That branch of the department designated herein as Bureau of Highways was created for the purpose of carrying out the Highway Bond Acts. It has such a huge task, requiring so complete an organization for one specific purpose that it almost constitutes a separate department. It is, however, a part of the Department of Engineering and is administered through the direction of members of the Advisory Board delegated to that duty.

PERSONNEL.

At the date of this writing, November 1, 1916, the Department of Engineering is organized as follows:

ADVISORY BOARD.

Hiram W. Johnson	Governor (Chairman)
W. F. McClure	State Engineer
J. J. Dwyer	President State Board of Harbor Commissioners
F. W. Hatch	General Superintendent of State Hospitals
Charles D. Blaney (Chairman), N. D. Darlington, Charles F. Stern	State Highway Commission

CONSULTING BOARD.

Alexander Gordon........Chairman

G. W. Tatterson, Stockton.
W. J. Smith, Grand Island.
M. J. Boggs, Colusa.
E. S. Brown, Sacramento.

EXECUTIVE OFFICE.

Title	Name	Entered service
State Engineer	W. F. McClure	Feb. 12, 1912
Secretary	Earle Freeman	Mar. 13, 1912

GENERAL OFFICE BUREAU.

Secretary........Director

Title	Name	Entered service
Division of Correspondence—		
Stenographer	Lucy K. Adams	April 1, 1912
Stenographer	Henrietta Burt	May 16, 1913
Messenger	Wesley J. Ketcham	July 21, 1915
Division of Accounts—		
Auditor	J. H. Clarke	Nov. 11, 1911
Filing Clerk	Chas. Johnston	July 8, 1907
Filing Clerk	J. C. McCalmont	Mar. 26, 1912
Clerk	A. J. Adams	May 28, 1909
Clerk	H. B. Glover	May 16, 1916
Clerk	Thos. McCully	Feb. 1, 1916
Clerk	F. M. Stewart	July 28, 1916
Clerk	N. E. White	April 15, 1912
Stenographer	M. A. Ahern	June 1, 1916
Stenographer	G. H. Hermansen	Aug. 4, 1916

BUREAU OF ARCHITECTURE.

State Architect........Director
Assistant State Architect........Superintendent

Title	Name	Entered service
Director's Office—		
State Architect	George B. McDougall	Aug. 22, 1913
Assistant State Architect	Jas. S. Dean	Aug. 1, 1912
Stenographer	Grace E. DuFour	Aug. 1, 1912
Stenographer	Elsa Koch	Mar. 25, 1914
Stenographer	Gladys McMillan	Aug. 3, 1916
Clerk	Harold McMillan	Oct. 1, 1914
Blue Printer	Frank Butler	April 1, 1912
Architectural Division—		
Assistant State Architect........Chief		
Chief Architectural Designer	Chas. F. Dean	Sept. 23, 1911
Architectural Designer	R. E. Backus	Sept. 1, 1912
Architectural Designer	A. R. Widdowson	July 17, 1911
Specification Writer	W. C. Hough	Aug. 11, 1913
Estimator	I. C. Satterlee	July 17, 1914
Draftsman	Geo. J. Adams	Aug. 16, 1915
Draftsman	W. E. Baumberger	Aug. 24, 1914
Draftsman	P. W. DeLongchamps	Aug. 11, 1913
Draftsman	J. G. Heath	Feb. 1, 1913
Draftsman	H. F. Horn	Aug. 25, 1913
Draftsman	Walter J. Long	Nov. 12, 1912
Draftsman	Carleton Pierson	Jan. 20, 1913
Draftsman	Leroy F. Sherwood	Jan. 1, 1913
Engineering Division—		
General Superintendent........Chief		
General Superintendent		
Structural Engineer	Clarence H. Kromer	Feb. 16, 1913
Mechanical Engineer	L. B. Luppen	Aug. 1, 1912
Mechanical Draftsman	A. J. Zschokke	Jan. 7, 1914

BUREAU OF ARCHITECTURE—Continued.

Title	Name	Entered service
Engineering Division—Continued.		
Mechanical Draftsman	J. B. Hawley	July 12, 1915
Mechanical Draftsman	C. A. Henderlong	April 28, 1914
Mechanical Draftsman	E. H. Hogan	Mar. 4, 1914
Mechanical Draftsman	L. E. Rushton	July 6, 1915
Mechanical Draftsman	P. H. Steiner	Oct. 19, 1914
Mechanical Draftsman	C. G. Zschockelt	June 30, 1915
Electrical Engineer	G. D. Jones	
Electrical Draftsman	G. M. Simonson	Sept. 22, 1913

BUREAU OF ECONOMICS.

Assistant State Engineer — Director

Title	Name	Entered service
Assistant State Engineer	Paul M. Norboe	May 17, 1907
Flood Control and Reclamation Division—		
Assistant State Engineer — Chief		
Flood Control Engineer[1]	E. A. Bailey	June 1, 1912
Navigation Division—		
Assistant State Engineer — Chief		
Chief Engineer, San Francisco Harbor[2]	Frank G. White	July 7, 1916
Hydrographer	J. B. Brown	June 26, 1913
Superintendent of River Work	W. W. Wooldridge	Jan. 1, 1908
Foreman, river work	Frank E. Wooldridge	Sept. 1, 1909
Foreman, river work	Clifford Childers	May 15, 1912
Clerk	Thomas Sweeney	April 20, 1914
Boat Engineer	Orland W. Wallace	May 15, 1912
Cook	Hom Wo[3]	Nov. 2, 1914
Irrigation Division—		
Assistant State Engineer — Chief		
Project Examiner	W. L. Huber[4]	Occasional.
Division of Cooperative Research—		
Assistant State Engineer — Chief		
U. S. Geological Survey—		
Topographic	George A. Davis	
Hydrographic	H. D. McGlashan	
U. S. Department of Agrirclulture—		
Irrigation Inquiry	Frank Adams	
Division of Institutional Service—		
Assistant State Engineer — Chief		
Engineer	E. D. Nickerson	April 18, 1914
State Road Division—		
Assistant State Engineer — Chief		
Road Engineer	H. H. Blee	April 10, 1913
Location Engineer	R. F. Williams[5]	Feb. 15, 1912
Road Superintendent	E. M. Baxter	June 1, 1910
Road Superintendent	H. L. Leventon	Sept. 16, 1915
Road Superintendent	Grant P. Merrill	Aug. 15, 1912
Road Superintendent	L. H. Cook	Oct. —, 1912
Road Superintendent	H. E. Wood	May 21, 1915
Road Superintendent	F. W. Matthews	July 15, 1911
Road Superintendent	W. H. Stone	June 29, 1915
Road Superintendent	Chas. M. Stewart	Dec. 30, 1911
Road Superintendent	L. C. Chase	June 1, 1913
Road Superintendent	W. H. Dool	Oct. 1, 1914
Road Superintendent	E. E. Newell	June 7, 1915
Road Superintendent	J. E. Mitchell	May 13, 1912
Road Superintendent	W. J. C. Dinsmore	May 23, 1913

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[1] Assigned to duty with State Reclamation Board.

[2] Appointed Chief Engineer, San Francisco Harbor Commission, succeeding Jerome K. Newman, July 1, 1916.

[3] Native American of Chinese parentage.

[4] Occasionally employed for special occasions.

[5] Transferred from Highway Commission Division, June 6, 1916.

The Bureau of State Highways, under the directorship of the Highway Commission with Mr. A. B. Fletcher, Highway Engineer, has such an extensive list of employees, and inasmuch as the commission will submit separate report of its work, the personnel is omitted here.

In addition to the employees enumerated above, which constitutes a permanent force required for the orderly conduct of the various duties devolving upon the Department of Engineering, there is a large number of semipermanent and temporary employments such as road engineers, foremen and laborers, teamsters, cooks, etc., employed on mountain roads during the summer; foremen, laborers, cooks, etc., employed from time to time on river work; draughtsmen, tracers, computers, inspectors, etc., required in the architectural division during rushes of work, and extra clerks and stenographers in the several divisions at times when work accumulates.

STATE INSTITUTIONS.

The state institutions for which the services of the Department of Engineering are required under the law, are as follows:

Educational.

Chico State Normal School.
Fresno State Normal School.
Humboldt State Normal School, Arcata.
Los Angeles State Normal School.
San Diego State Normal School.
San Francisco State Normal School.
San Jose State Normal School.
Santa Barbara State Normal School of Manual Arts and Home Economics.
San Luis Obispo State Polytechnic School.

Eleemosynary.

California School for the Deaf and the Blind, Berkeley.
Industrial Home of Mechanical Trades for Adult Blind, Oakland.

State Hospitals.

Agnews, Agnew, Santa Clara County.
Mendocino, Ukiah, Mendocino County.
Napa, Napa, Napa County.
Norwalk, Norwalk, Los Angeles County.
Southern California, Patton, San Bernardino County.
Stockton, Stockton, San Joaquin County.
Sonoma State Home (for feeble-minded children), Eldridge, Sonoma County.

Punitive.

State Prison, Represa, Sacramento County.
State Prison, San Quentin, Marin County.

Reformatory.

Preston School of Industry, Ione, Amador County.
Whittier State School, Whittier, Los Angeles County.
California State School for Girls, Ventura, Ventura County.

Military.

Veterans' Home, Yountville, Napa County.
State Arsenal and Armory, Sacramento.
State Armory, San Francisco.
State Armory, Los Angeles.
State Armory, Stockton.

Miscellaneous.

State Capitol, building and grounds, Sacramento.
Governor's Mansion, Sacramento.
State Printing Office, Sacramento.
State Fair, buildings and grounds, Sacramento.
Sutter's Fort, buildings and grounds, Sacramento.

PLATE I.

Mission Solano, Sonoma, restored.

Old Greek Church at Fort Ross, restored.

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Harbor Front, wharves, piers and buildings, San Francisco.
Mission Solano, Sonoma County (restoration).
Old Russian Church, Fort Ross (restoration).
State Fish and Game Commission, Hatcheries.
Los Angeles Exposition Building.
State Office Buildings, Sacramento (authorized, not commenced).
State Office Buildings, San Francisco (authorized, not commenced).

Architectural service at state institutions.

All work of the department pertaining to state buildings, whether relating to the preparation of plans and specifications, or erection and installation, including mechanical plants of every kind, is executed by the architectural bureau of the department, and a review of the work accomplished by that bureau will be found under the report of the State Architect.

Engineering service at state institutions.

Whenever improvements are contemplated at an institution, whether it be a new building, or whether water pipes, sewers, walks or drives are to be extended, the first thing needed is a topographic map, showing the location of existing buildings and all the natural and artificial topographic features of the grounds. To meet this demand the department has from time to time executed surveys at several institutions and constructed maps thereof, so that now the department possesses such maps of many of the state institutions. Lack of funds, however, has prevented the prosecution of these surveys for all institutions. The absence of data furnished by such maps is keenly felt whenever the architects are called upon to design a new building, as its location and surroundings control or, at least, suggest the type of architectural appearance to be given to the building. The engineers who design the heating, water supply and sewage are greatly aided in their studies by accurate maps. The proper location of roads, drives and walks, and the arranging of scenic effects by the landscape artists are also better done when access is had to such data.

It is hoped that the department will soon be able to make such maps of all institutions not yet surveyed, and to bring those already made up to date.

Agnews State Hospital.

Sewerage. Excepting for breaks in the outfall sewer from washouts caused primarily by the work of a dredge, there has been little trouble with the sewer system. These breaks were repaired upon the advice of the department by the employees of the hospital.

The disposal of sewage here is by discharge into San Francisco Bay. Many of the towns and cities situated around the bay discharge their raw sewage into the head of the bay. Although the waters are subject to daily tides, the sewage is not carried out to sea, but remains to decompose in a comparatively small area. The offense from this will in a few years become unbearable, and the discharge of raw sewage into the bay will be prevented.

This is a matter that should be given thought at the State Hospital and plans prepared for a treatment plant that will render its wastes inoffensive.

Land Drainage. In previous reports it has been pointed out that a large part of the hospital's lands could be made more productive by drainage. A plan has been partially worked out, but nothing has ever been done to carry it into effect. The matter is again commended for consideration.

Mendocino State Hospital.

Water Supply. The dam and reservoir provided for in two appropriations, 1911 and 1913, of $12,500 each, has been completed. The dam is 63 feet high and the reservoir has a capacity of about 45,000,000 gallons. This, with the 8,000,000 gallons of the old reservoir, should give the institution ample water for a long time.

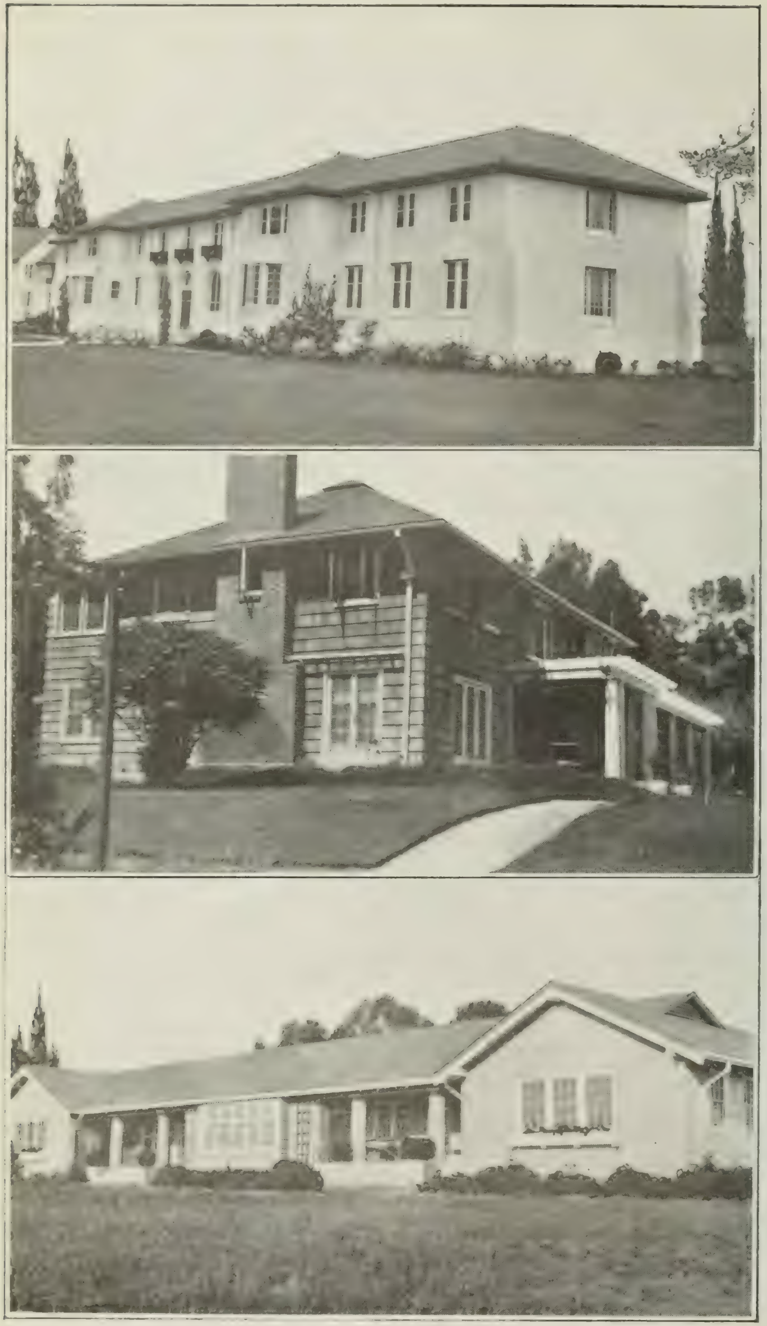
The construction of this dam proved to be much more difficult than had been anticipated. What appeared on the surface to be a rock ledge proved to be badly shattered underneath, and it was necessary to carry the concrete of the dam nearly a hundred feet into the rocky mass.

Even at this distance the formation was not satisfactory, and it was believed that a water-tight contact could not be effected. It was thought, however, that any leakage around the dam through the country rock would not become dangerous to the structure. Its completion and the filling of the reservoir proved the correctness of the theory, as when the water had reached a depth of 50 feet on the dam, leakage around it, which appeared in the creek bed below, developed to quite a considerable quantity.

This leakage is all intercepted by the lower dam, and so long as it does not exceed in quantity the capacity of the pipe lines conveying the water to the hospital, no loss will occur.

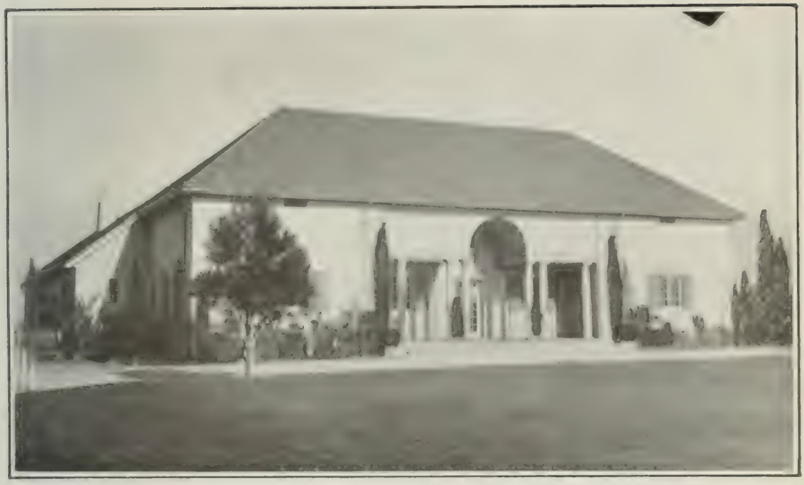
It is not seen now how the leaks can be stopped excepting at great cost, but as no danger is apparent it is not believed action of any kind is required.

Repairs to lower dam. This dam, 27 feet high, was constructed several years ago, before the state had a department to design such works. The section is so thin that only the very best of materials and workmanship could have preserved it. A slight vertical crack developed in the masonry over the outlet, and as no suitable foundation could be found for buttresses, a rock fill was placed against the downstream face of the dam. To prevent the fill being washed away by floods, the dam being of

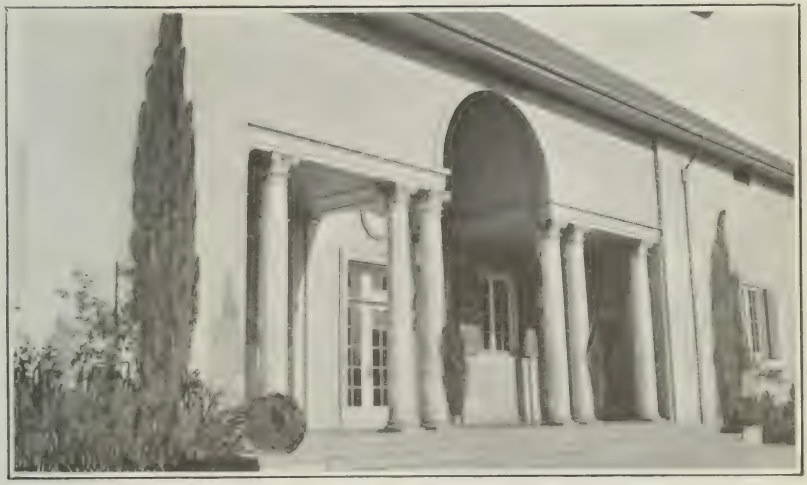


Top—Female Nurses' Home, Agnews State Hospital.
Middle—Superintendent's Residence, Southern California State Hospital.
Bottom—Chamber's Cottage, Napa State Hospital.

PLATE III.



Women's Building, State Fair.



Entrance, Women's Building, State Fair.

the overflow type, a wasteway was cut in the crest of the dam and a concrete chute built down the slope of the fill, terminating in an upturned apron at the lower end to deflect the water upward and beyond the footings, where it falls upon a ledge of rock, avoiding all scour.

Pipe Line. An appropriation of $15,000 was made by chapter 192, 1915, to replace the old pipe line which became so badly corroded as to be frequently breaking and threatened complete failure. The new pipe was laid and completed under the direction of the department, superintendence and inspection was furnished by the hospital, Mr. N. S. Burge, general manager, being in charge. The unskilled labor was mostly performed by patients.

Napa State Hospital.

Water Supply. The water for domestic use and irrigation is obtained from three sources, viz: a storage reservoir in a canyon above the institution, from Spencer Creek and from wells on the grounds.

The dam making the reservoir, which is called by the people at the hospital Lake Marie, was constructed several years ago. It was under construction at the time the Department of Engineering was created, and was completed under the direction of the department.

It is an earth and rock fill, having a concrete core wall and rock riprap on the water slope. An ample wasteway is provided by a cut through rock at one end of the dam.

In the spring of 1916 a leak developed which caused the management of the hospital considerable alarm. An engineer from the department visited the dam, and while he did not find that any immediate danger threatened, under his direction the water was lowered in the reservoir. When the surface had fallen about four feet the leak ceased, indicating that the cause existed somewhere within four feet of the height of the wasteway. The inflow from the creek had ceased, so it was not possible to raise the surface of the water and start the leak again, so as to form a ''lead'' to trace to its origin. It is intended that when the reservoir shall fill again, explorations shall be made to ascertain the cause and apply remedies.

Withdrawing water as above stated depleted the supply to such an extent that the institution was threatened during the summer with a serious shortage. The supply from Spencer Creek had practically ceased. One of the two good wells at the institution was lost two years ago by accidentally dropping a heavy pump into it, which resisted all effort to remove.

An old unused well in the boiler room was cleaned out, relined with new casing and put into service. This, with the old well already in use, furnished about 120,000 gallons a day when being pumped continuously. Early in October the management engaged a well-driller to drill another well on the grounds, but at the date of this writing it is not completed. It is not anticipated that these wells will furnish more water than is required with the most rigid economy, unless copious rains shall soon occur to fill the reservoir.

The experience of this season, with the certainty that the quantity of water needed for the institution will be greater every year, demonstrates the imperative need for measures to be at once adopted to secure a sufficient supply from another source.

It has been suggested that another dam might be constructed in the canyon about a mile below Lake Marie.

In the absence of data as to run-off and without thorough exploration of the proposed reservoir site this department feels grave doubt that a reservoir of sufficient capacity can be filled, or if filled, that it would hold the water impounded. This doubt is due to the knowledge of the very limited area of watershed tributary to the site, and to the broken character of the rock forming the floor of the reservoir.

It is believed that a careful reconnaisance of the hills and canyons for several miles around might disclose an ample supply of water for Napa State Hospital, as well as, possibly, some other near-by state institution.

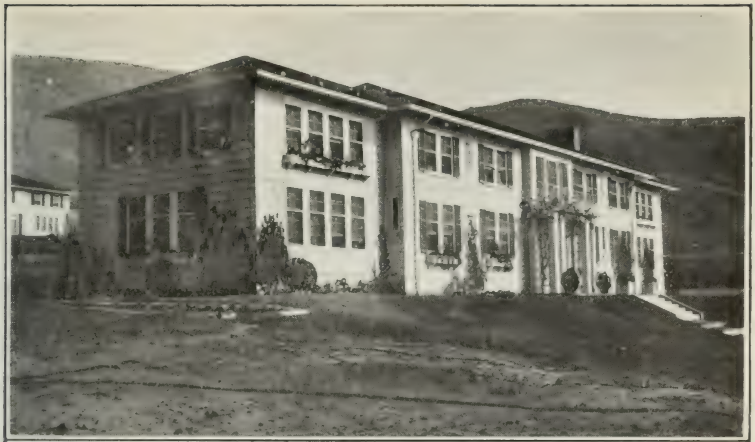
The Tide Land Reclamation. The reclamation of 380 acres of tide lands along the Napa River, as related in the last report, has proved very effective and has added a large area to the productive farming lands of the hospital. The tract is in need of a drainage system, the operation of which will extend the cropping season in the lowest portions several months. The department is considering plans for such system.

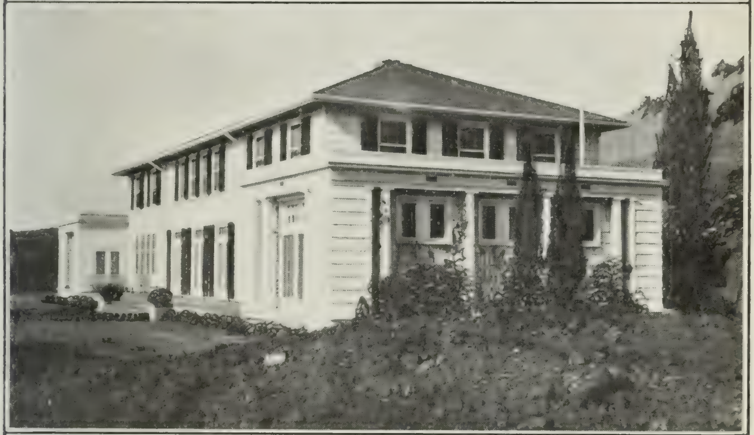
Stockton State Hospital.

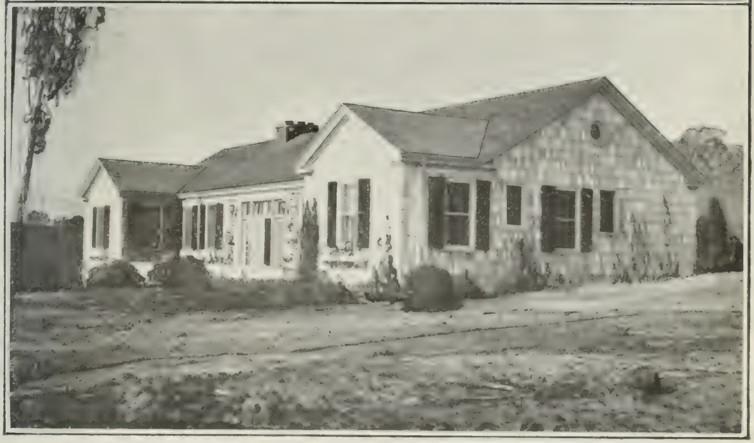
Farm Drainage. In former reports it has been stated that the hospital farm some two or three miles from the institution is subject to inundation. That danger is now fairly well protected against, but the surface drainage from the higher lands of the farm accumulates in the low lands, and being augmented by seepage from the water against the outside of the levees, renders the lowest portions unproductive. Estimates have been furnished to the institution showing that a pumping plant to clear the land will cost about $7,000.

Sonoma State Home.

Water Supply. The water for domestic use at this institution is obtained from several springs in the wooded ravines of the hills in the western portion of the estate. The water, which is of most excellent quality, is conveyed in iron pipes to two concrete tanks of about 1,000,000 gallons capacity each, situated on a hill about 150 feet in elevation above the grounds of the home. From these tanks it is distributed to the buildings and grounds. For many years this source







Top—Typical Cottage, State School for Girls, Ventura.
Middle—Typical Cottage, State School for Girls, Ventura.
Bottom—Detention Building, State School for Girls, Ventura.

furnished sufficient water for domestic purposes and also for irrigating the lawns, but with an increase in population the supply became inadequate.

In 1910 the department constructed an earthen dam across the lower end of a small valley in the hills about a mile back of the home, creating a reservoir with a capacity of about seventy-five acre feet. A pipe line to the institution enables this water to be used for irrigation about the grounds; to supply fire hydrants, and also furnishes water for flushing purposes in some of the buildings. The quality of the water, however, renders it unfit for domestic use, and it is excluded from the domestic pipes.

A gas engine in the creek which traverses the estate pumps water through a pipe line to the dairy farm, where it is used for irrigating garden truck.

The domestic supply is not fully up to the requirements of the home. In the summer when the flow from the springs reaches the minimum, much apprehension is felt that a shortage will ensue, and with the accession of population which will follow the completion of accommodations for them now under construction or contemplated, the supply will surely be insufficient. Some saving can be made in the use of water by improving the plumbing of some buildings, but undoubtedly an increase of population will create demands that can not be met from the present source.

The new buildings now being erected will also need a supply of irrigation water to improve its grounds. This can not be had from the present system.

An appropriation of $10,000 was made (chapter 433, Statutes 1913) for improving the water supply. An attempt was made by drilling wells, but failed to find a supply.

The geologic formation of the country in the near vicinity of the home does not give encouragement that a source of supply of potable water sufficient for the institution can be found within a reasonable distance.

The department is now working upon a plan to install a pumping plant to take water from the bed of Sonoma Creek, and use that for all purposes that do not require pure water, and to install a plant to sterilize and filter that required for domestic use.

Sewerage. The hydrolytic tank under construction at the time of the last report has been completed and installed with a chemical plant for treating the effluent. It has given satisfactory service since its installation, but has not been in operation long enough to determine the best method of manipulation under the changing conditions of continuous use.

The boys' barracks being constructed on the grounds is located away from the system of sewer pipes, and will require an independent line to reach the hydrolytic plant. No funds are now available for that purpose.

Roads. During the present biennium the road to the fields in the hills has been changed in alignment, substituting a grade of 8 per cent maximum for the former dangerous grades. The funds were not sufficient for surfacing all of it, but it is probable that the surfacing may be accomplished a little at a time by the institution.

There is need, though, of an appropriation to extend road building into the remote hayfields.

State Fair Grounds.

An act approved June 6, 1913, appropriated $10,000 to be used for the disposal of drainage and sewage from the State Fair grounds at Agricultural Park, Sacramento.

Owing to the absence of any sewers or means of public disposal of sewage in the portion of the city where the fair grounds are situated, sanitary conditions were extremely bad, and growing worse at each recurrence of the State Fair. There being no means of effecting proper disposal of the sewage, temporary expedients were resorted to each year until 1916.

The city's new sewer system was extended to the vicinity of the fair grounds, the local system was connected up in time to be of service to the National Guard Mobilization Camp, which preceded the State Fair a few weeks.

For the purpose of connecting the system with the city's sewers, new lines were laid throughout the grounds as well as connecting several wash racks at the barns and stock pens.

The State Fair now has a complete and serviceable sewer system so laid that all new buildings erected in the future may be easily connected therewith.

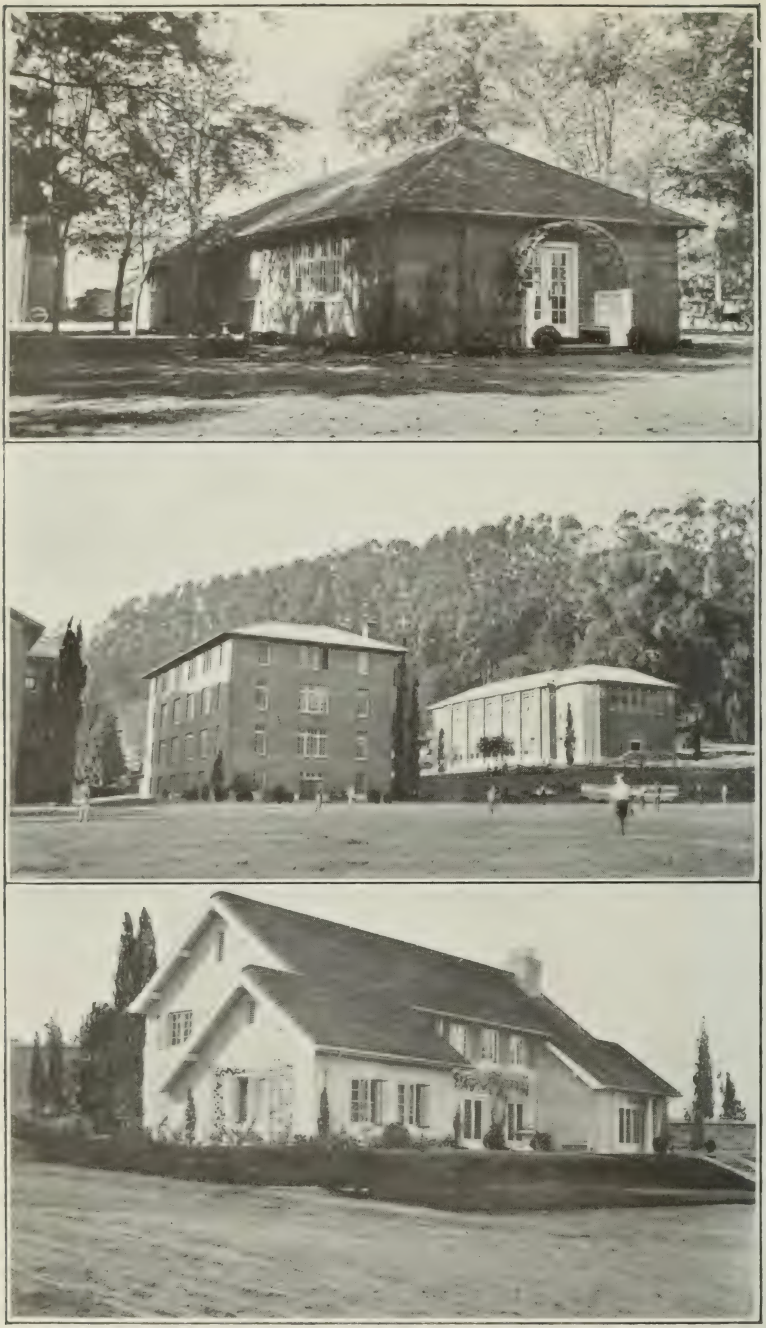
BUREAU OF ARCHITECTURE REPORT COVERING OPERATIONS FROM NOVEMBER 1, 1914 TO OCTOBER 31, 1916.

By George B. McDougall, State Architect.

The Bureau of Architecture of the Department of Engineering has charge of all work of the Department of Engineering: First, at 23 different state institutions, which have a combined population in students, patients and prisoners of about 20,000; and second, at 17 other state institutions or enterprises, making a total of 40 different institutions and enterprises.

During the biennial period just ended the bureau has been housed on the sixth floor of the Forum building, under conditions which have been satisfactory and favorable to the production of the best results.

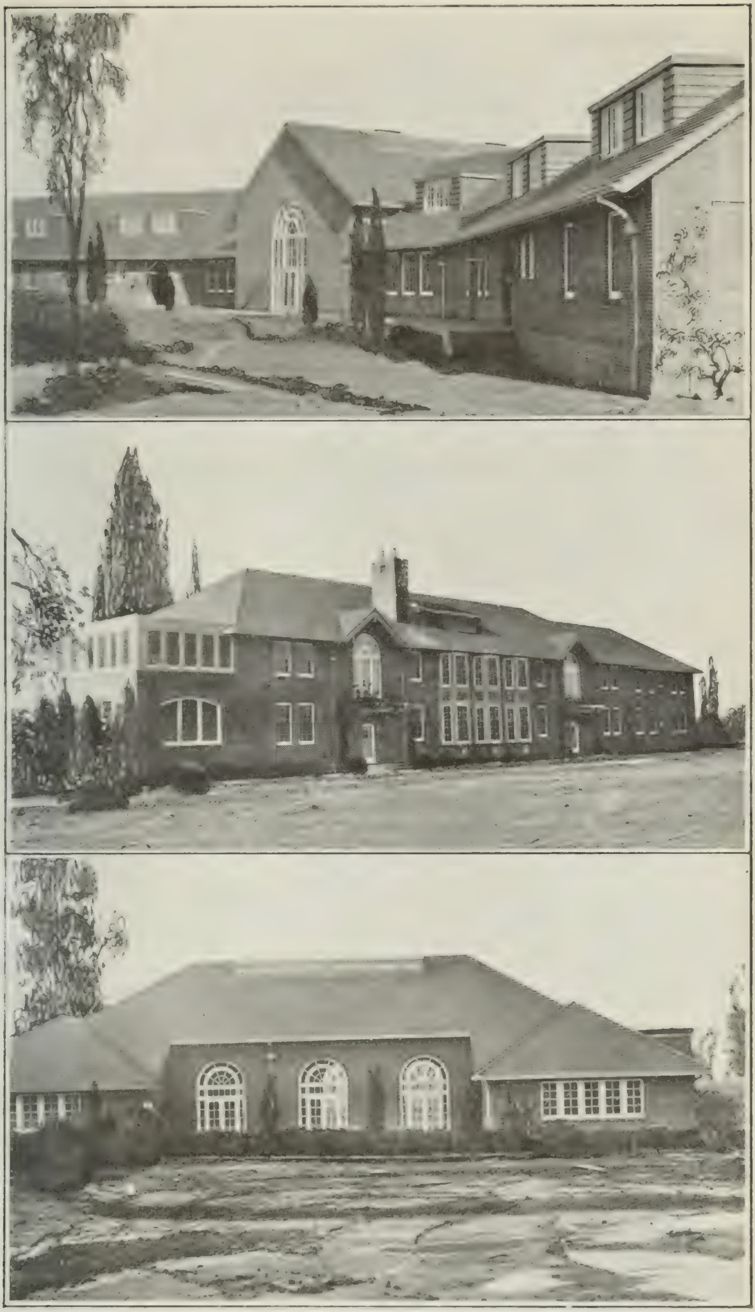
PLATE V.



Top—Cafeteria, San Jose State Normal School.
Middle—Gymnasium, School for Deaf and Blind, Berkeley.
Bottom—Warden's Residence, State Prison, Represa.

(p. 26)

PLATE VI.



Top—Kitchen and Commissary, Norwalk State Hospital.
Middle—Workers' Cottage, Norwalk State Hospital.
Bottom—Power House, Norwalk State Hospital.

(p. 26)

There were authorized by the legislature of 1915, 81 special appropriations, aggregating $1.148.365.08, for building construction distributed amongst these 40 different institutions and enterprises and, in addition to this, estimates from the several boards of management have been approved during the past two years for 43 different pieces of construction, similarly distributed, aggregating in cost $216,055.26. This, added to the amount of the appropriations, makes a total of $1,364,420.34 for 124 different pieces of work.

There is necessarily a considerable amount of office work done in connection with proposed construction at these various institutions that is never carried through and is not taken into account in the above figures. In addition to this, it is impossible for us to deny requests for counsel and advice from the various institutions, and the aggregate amount of time given during a biennial period to consultation, making of sketches and general assistance, is very considerable.

Of these 124 pieces of work referred to above, 14 were of a value less than $1,000; 75 were between $1,000 and $12,500; 13 were between $12,500 and $20,000; 19 were between $20,000 and $50,000, and three were over $50,000.

The extremely large proportion of work of small cost as indicated by the figures just given, together with work in connection with proposed construction never erected and the large amount of time consumed in advisory consultation, already referred to, make the average percentage of cost for our office work higher than would be the case otherwise.

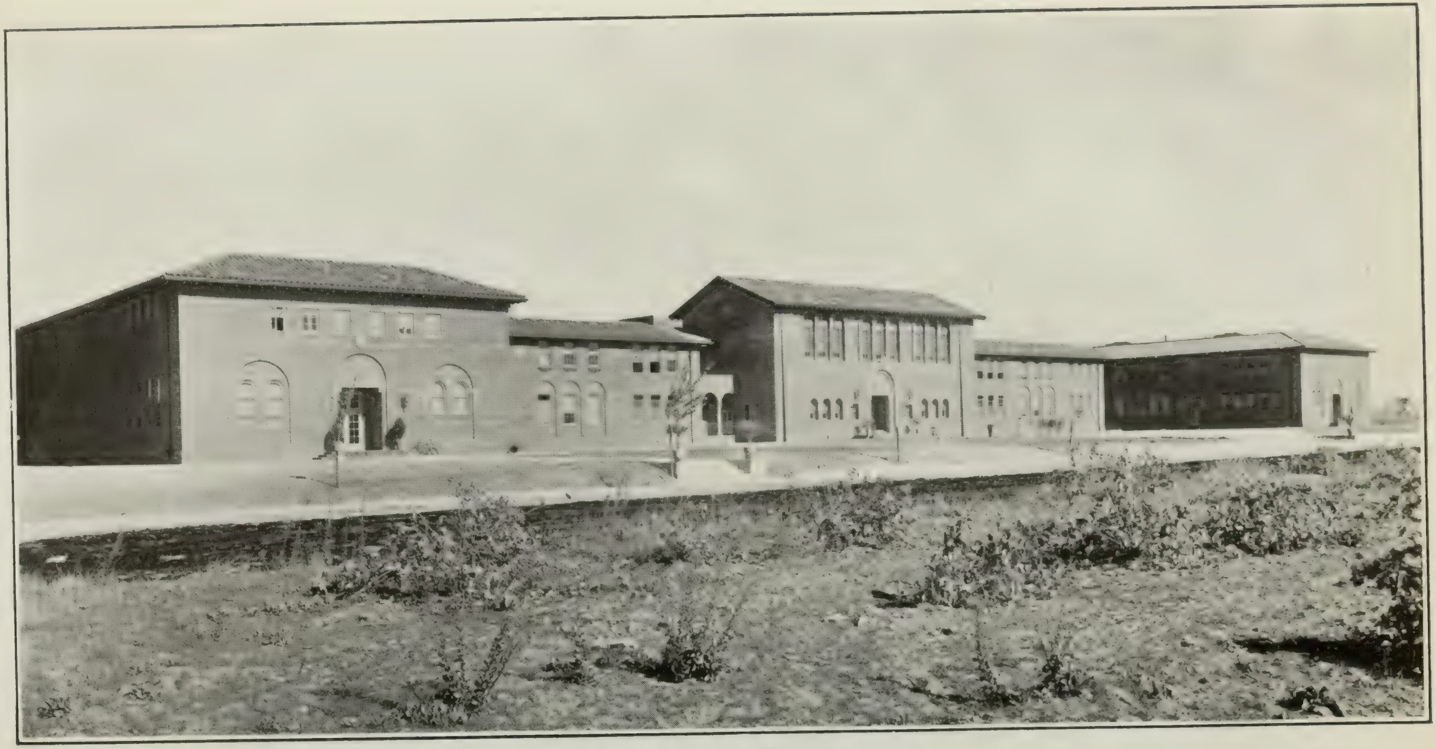
For the purpose of indicating in detail the cost of our work, a list of 29 items, fairly representing the total of 124, is given at the end of this report. The total cost of these 29 pieces of construction as shown by our books is $466,209: the expense for our office work, $23.790.57, or 5.10 per cent of the total, and the expense for inspection $9,801.72, or 2.1 per cent of the total. These constructions are entirely completed.

In the biennial report for the period which ended October 31, 1914, it was shown that the cost percentages corresponding with those given above were 4½ per cent and ¾ per cent; this indicates increases for the period ended October 31, 1916, of ⅗ per cent for the office work and 1⅓ per cent for inspection. Notwithstanding these figures, there has been a very considerable increase of efficiency during the biennial period ended October 31, 1916, over the biennial period immediately preceding it, for the reason that during the latter 136 pieces of work of an aggregate cost of $3,222,378.81 were handled, and during the former 124 pieces of work, or only 12 pieces of work less, of an aggregate cost of only $1,364,420.34, or only a little over one-third the cost, were handled. Furthermore, in the figures above given in connection with both the biennial periods, and on which the percentages are computed, "days labor" work, for which the bureau acts as contractor and builder, as well as architect, are included; during the period ended October 31, 1916, the expenditure for this "days labor" work was $216,055.26, whereas during the period ended October 31, 1914, only $163,973.81 was expended in this way. Also, during the period ended October 31, 1916, our overhead for this "days labor" work was greatly increased on account of going into greater detail than before, in getting bids, with the result that the bids themselves have been much lower, having much more than offset the increase in our overhead.

The schedule of proper minimum charges of the American Institute of Architects, which schedule today governs the practice of all our best architects, makes 6 per cent of the total cost the architect's minimum compensation in any case, and where the work is of small cost, and in connection with the remodeling of existing buildings, 10 per cent and sometimes 15 per cent of the cost is paid; the institute's schedule also provides that the owner, in addition to this percentage payment, shall defray the expense (amounting to about 1 per cent of the total cost) involved in securing special expert service covering structural engineering and mechanical engineering, which latter includes power plants, heating, ventilating and electrical engineering (all of which items are included in the 5.10 per cent above mentioned), also the expense involved in the continuous service at the building site itself of a clerk of works or superintendent of construction, which corresponds to our expense for inspection. In cases where the architect acts also as general contractor, which cases correspond to our "days labor" work, the builder's fee of 10 per cent is added to the fee of the architect, thus making the total cost, outside of that of the special expert service above referred to, 16 per cent; this "days labor" work as done by the Bureau of Architecture was included as above indicated in arriving at the average cost of 5.10 per cent already mentioned.

As a means of increasing efficiency, we are putting into effect a change in the organization of the entire Department of Engineering. A Review Board, composed of the State Engineer, the State Architect and the heads of divisions, has been formed and meets monthly. Committees, composed of the various members of the board, consider and make suggestions regarding the different branches of the department's work, which are discussed by the board and put into effect when they are found to be sound. One of the results of this scheme of organization will be the preservation for the benefit of those who come after the present occupants of the various positions in the department, of the rules and methods of operation which have been proven by experience to be best.

PLATE VII.



Fresno State Normal School.

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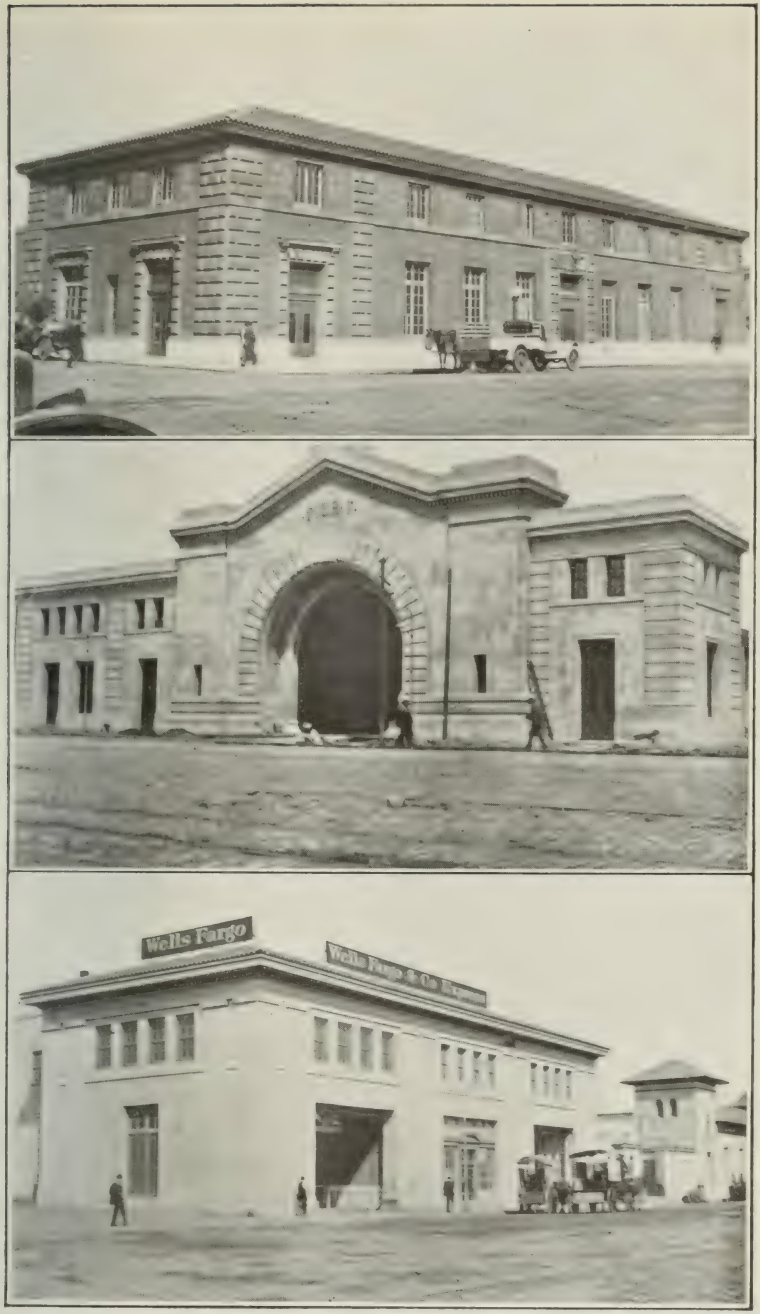
PLATE VIII.



Top—San Francisco Harbor, Post Office.
Middle—San Francisco Harbor, Pier Entrance.
Bottom—San Francisco Harbor, Express Office.

(p. 28)

Under this changed scheme of organization the Bureau of Architecture, as already stated, is responsible for all Department of Engineering work at all the state institutions. The State Architect is the director of the bureau. The Assistant State Architect has general supervision over all the work of the bureau and is chief of the Division of Architecture. The General Superintendent is chief of the Division of Engineering, which includes mechanical, electrical and hydraulic engineering, also all work in the field. This change in responsibility and organization of the Bureau of Architecture is resulting in better control and consequently in increased efficiency in handling the department's work at the institutions.

The state should have the best work in architecture as well as along all other lines. The Bureau of Architecture is securing this kind of work about as follows:

> A full appreciation of the building needs of the various state institutions is secured by frequent consultation with the executive heads and boards of management and by frequent visits of the State Architect and his assistants to the institutions.
>
> The designers in charge of the planning and designing of the buildings, from having been in the state's employ for a considerable length of time, have become specially expert as to the building needs of the state institutions and the best methods of meeting them.
>
> An ample force of draftsmen—architectural, structural, mechanical and electrical—is employed, with the result that working drawings, large scale drawings and full-size details, as the basis for bids and contracts, are thoroughly complete; this is true also of the specifications which form a part of the basis for bids and contracts; the specification writers keep in continuous touch with the market as to all building materials. Since our mechanical and electrical engineers, structural engineers and specification writers, also our cost estimators, work in conjunction with our architectural men—all employees being under the continuous charge of heads of the several divisions—we are especially well situated to secure perfect and complete sets of working drawings and specifications with a minimum of lost motion.
>
> Our drawings more clearly delineate all the details of construction than the drawings which the average architect provides and, on account of the clearness of our drawings and specifications, bidders are able to estimate more closely the cost of the work; the lower bids run very close to each other in practically every case.

The above conditions as to drawings and specifications, taken together with the continual presence at building sites of competent inspectors, make it possible for us with the least friction and expense to secure the completed buildings in accordance with contract agreements. Field inspectors are kept in constant touch with the office, through the supervision of the general inspector, who is connected with the Engineering

Division. The testing engineer of the State Purchasing Department cares for the analysis and testing of materials entering into the construction of buildings where such analysis and test are necessary to eliminate doubt as to whether quality and combinations of materials agree with specification requirements.

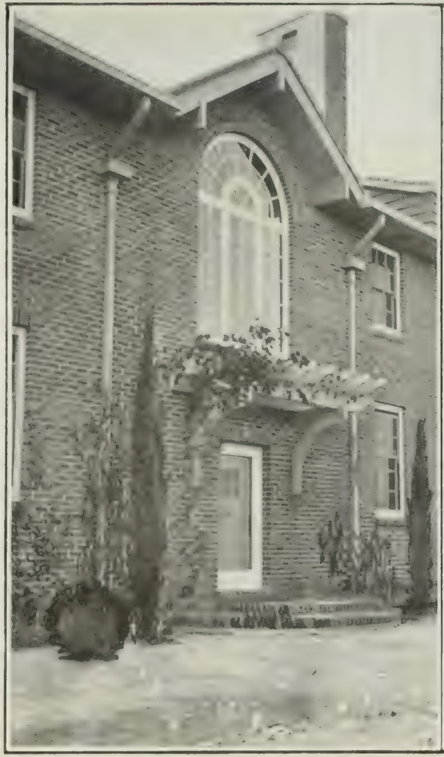
A change was made by the legislature of 1915 in section 11 of the engineering law; this section now provides that the Board of Control, with the approval of the Governor, may, in cases where the best interests of the state require it, arrange for the selection of the architects from outside the Department of Engineering, by public competitions, the State Architect being the architectural advisor of the Board of Control in instituting and conducting such competitions. This course is now being followed in connection with the San Francisco State Building, and is to be followed also in connection with the Capitol Extension buildings to be erected in Sacramento.

The present organization of the Bureau of Architecture of the Department of Engineering and this provision for the holding of competitions provide the means of efficiently meeting all the exigencies of the state's building requirements.

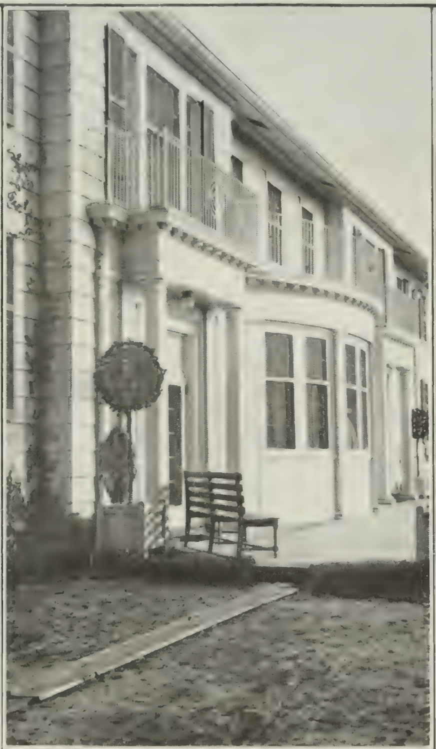
Following is the partial list of construction hereinabove mentioned, with the total cost of each item and the percentage of expenditure for services in the office and inspection in the field:

PLATE IX.

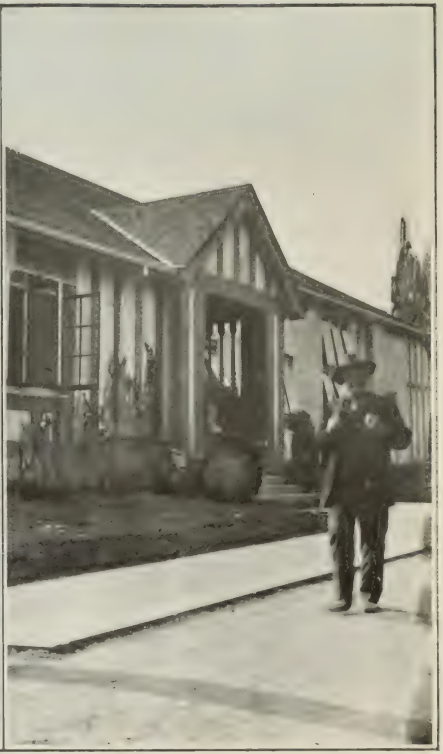
ARCHITECTURAL TREATMENT OF ENTRANCES.



Workers' Cottage, Norwalk State Hospital.



Hospital, California School for Girls. Ventura.



Amusement Hall, Veterans' Home.

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Number	Building	Institution	Cost	Per cent for office work	Expended for office work	Per cent for inspection	Expended for inspection	Total per cent	Remarks
1	Women's Building	State Agricultural Park	$28,500 00	6.68	$1,905 58	2.38	$679 36	9.06	Contract; building completed.
2	Fire escapes	Cal. School for Deaf and Blind	1,500 00	3.45	51 80	1.33	20 00	4.78	Contract; building completed.
3	Garage	California School for Girls	2,500 00	6.86	171 52			6.86	Day labor; building completed.
4	Cottage for males	California School for Girls	5,100 00	8.37	427 10			8.37	Day labor; building completed.
5	Commissary Building	California School for Girls	7,000 00	6.54	458 12			6.54	Day labor; building completed.
6	Farm buildings	California School for Girls	6,000 00	6.82	409 44			6.82	Day labor; building completed.
7	Two cottages and Detention Bldg.	California School for Girls	46,500 00	5.59	2,599 01	3.95	1,836 59	9.54	Contract; buildings completed.
8	Temporary school buildings	Humboldt State Normal Schl.	17,000 00	3.92	666 50	4.55	773 11	8.47	Day labor; building completed.
9	Additions to Manual Arts Bldg.	Los Angeles Normal School	2,500 00	3.89	97 36			3.89	Day labor; building completed.
10	Manor House	Mendocino State Hospital	4,500 00	12.54	564 27			12.54	Day labor; building completed.
11	Additions to Commissary Bldg.	Mendocino State Hospital	14,131 00	3.05	431 75			3.05	Day labor; building completed.
12	Steward's cottage	Mendocino State Hospital	3,000 00	17.07	512 06			17.07	Day labor; building completed.
13	Elevators	Mendocino State Hospital	7,500 00	1.67	125 50	.93	70 00	2.60	Contract; building completed.
14	Additions to South Pay Cottage	Napa State Hospital	15,000 00	5.90	885 52	3.67	550 34	9.57	Contract; building completed.
15	Cottage for men and women	Napa State Hospital	30,000 00	4.12	1,234 70	1.29	388 80	5.41	Contract; building completed.
16	Fish Hatchery buildings	Owens River Fish Hatchery	64,978 00	4.36	2,832 85	3.09	2,006 98	7.45	Day labor; building completed.
17	Class rm. and Domestic Science Bldg.	San Jose State Normal School	18,500 00	6.49	1,262 06	4.97	919 34	11.46	Contract; building completed.
18	Machinery Building	Santa Barbara St. Normal Schl.	7,000 00	4.67	327 23	1.30	91 31	5.97	Day labor; building completed.
19	Girls' Nursery	Sonoma State Home	22,000 00	4.76	1,458 21			4.76	Contract; building completed.
20	Cottages "N" and "O"	S. California State Hospital	41,500 00	3.68	1,526 87	1.51	626 27	5.19	Contract; building completed.
21	New boilers	Stockton State Hospital	7,000 00	1.67	116 69	2.42	169 90	4.09	Contract; building completed.
22	Hay barn	Stockton State Hospital	7,000 00	6.00	420 50	.33	23 00	6.33	Contract; building completed.
23	Electric wiring	Stockton State Hospital	10,500 00	9.90	1,038 06	1.74	183 60	11.64	Day labor; building completed.
24	Cottage for convalescents	Stockton State Hospital	27,000 00	4.15	1,120 10	2.04	551 82	6.19	Contract; building completed.
25	Cottage for male patients	Stockton State Hospital	27,000 00	4.15	1,128 18	3.37	911 30	7.52	Contract; building completed.
26	Ten sanitary cottages	Veterans' Home	22,500 00	4.56	1,251 86			4.56	Contract; building completed.
27	New bath rooms in Barracks	Veterans' Home	15,000 00	4.72	709 17			4.72	Day labor; building completed.
28	Bank screen	State Treasurer's Office, Capitol	3,000 00	3.57	107 17			3.57	Contract; building completed.
29	Painting	State Printing Office	2,000 00	.57	11 39			.57	Day labor; building completed.
	Totals		$466,209 00		$23,790 57		$9,801 72		
					5.10% of cost.		2.10% of cost.		

On the 15 constructions in the above list costing between $1,000 and $12,500 the percentage for office work was 6.36; for inspection was .73.
On the 5 constructions in the above list costing between $12,500 and $20,000 the percentage for office work was 4.89; for inspection was 2.82.
On the 9 constructions in the above list costing between $20,000 and $70,000 the percentage for office work was 4.85; for inspection was 2.25.

PART II.

HYDROECONOMICS.

Every body of water has its uses, and often one body may have several uses, all contributing to the welfare of man. Broad arms of the sea, stretching inland, offer easy highways for cheap communication and transportation for the communities along their shores. Broad rivers afford like facilities for commerce, and also furnish water for irrigation of the lands along their banks to produce that commerce. Tributary streams contribute power for lighting the streets and homes of communities created by the benign influences of the others, as well as operating the myriad wheels of industry. And all unite, in the mad moods of nature, to send destruction and ruin upon the works of their beneficence.

Each body or stream has problems of its own to be solved that its forces may be directed to beneficial use, some akin and some dissimilar in the methods of their solution.

SACRAMENTO RIVER PROBLEMS.

That in the Sacramento Valley lies a million acres of land periodically laid waste by the flood waters of the Sacramento River is too well known to need extended mention here. That concrete effort is being made to rescue that vast body of land from waste and convert it into an asset to the state is also known; but the method by which it is proposed to accomplish that object is not well understood by all. Indeed, many who are directly connected with the reclamation of the Sacramento Valley and the control of its rivers, misunderstand the plan and how it is to be carried out.

The Sacramento River traverses the valley for a distance along its course from Red Bluff to Suisun Bay of 264 miles. The banks of the river are higher than the land some distance away on either side between the river and the uplands rising to the foothills. This condition creates a long, wide trough on each side. Tributary streams entering at intervals have built up delta ridges across the troughs, converting them into basins. A notable example of this is the Knights Landing ridge which divides the west side trough into Colusa and Yolo basins. The channel of the river, occupying the ridge between the two troughs, is limited in its capacity to carry water.

From Red Bluff to the confluence of Stony Creek the water keeps well to the channel, but below that point the capacity is reduced, and flood waters are spilled over the banks into the basins. From Colusa to Feather River the capacity of the Sacramento River between banks is only 30,000 second-feet (cubic feet per second), while the records show that at Iron Canyon the flood flow has reached 254,000 second-feet, which flow was augmented by the waters of Stony Creek and other smaller streams on the west and by Mill Creek, Antelope Creek, Chico Creek and others on the east, all running large volumes not measured. Without including these numerous additions it is seen that the volume of water entering the upper reaches of the river is eight or ten times the capacity of the river through Glenn and Colusa counties to carry it.

Any water in excess of 30,000 second-feet must, of necessity, spill over into the basins at each side. These basins contain the most fertile land in the valley and their owners have for many decades endeavored with varying success to build levees around them to keep the water off. So long as these efforts were confined to small areas, little effect was had upon the flood plane of the water occupying the unreclaimed remainder, but as the levees were extended, joined together and made continuous, holding the water within narrower areas, the flood plane rose until it overtopped or breached the works confining it, and again inundated the basins. This happened again and again, and the conditions became more and more aggravated as the storage way in the basins was reduced.

As the river progresses down the valley its volume grows greater, the Feather River enters it, bringing the water from its own watershed as well as from the Yuba and Bear rivers. It is joined just above the city of Sacramento by the American River. The measurements of flood flows show that the influx of water to the valley from Red Bluff to Sacramento has amounted to 550,000 second-feet. The river channel at and below the city has a carrying capacity of only a little more than 100,000 second-feet, or about one-sixth of the quantity that would have reached Sacramento in the floods if it had not spread over the basins on each side, and been stored there to run off gradually.

Engineers have estimated that floods occurring before measurements were undertaken have reached a flow of more than 800,000 second-feet in the valley.

Whenever the waters leave the river to reach the basins they erode channels which continue to carry water after the water of the stream has receded within the banks of the river. Such division of the mid-stage and low water flow causes bars to form in the main river and impedes navigation. To prevent injury to navigation the integrity of the banks of the river must be maintained and side channels never allowed to reach the low water plane so as to divide the waters needed for the carriage of boats.

Many engineers and commissions have given study to the problems involved, and all agree that the only way to protect the low lands from inundation is to provide channels through them to carry away the water that has spilled over the banks of the river. And to preserve the navigability of the river its banks must be held intact by providing indestructible weirs for the passage of the excess waters.

The government in 1893 created the Debris Commission and directed it to devise means of controlling the inflow of mining debris from the mountains and of improving and maintaining navigable conditions on the rivers. After seventeen years of study, experiment and research the commission presented a plan[1] to effect the objects for which it had been created.

While the duties imposed upon the Debris Commission were confined to devising means to aid navigation, the report submitting its plan declares that there is no other way known to the commission by which navigation can be maintained and improved except the one offered which involves flood control of the streams and reclamation of the lands. Since the works necessary to improve navigation would benefit other interests it was considered that the cost should be borne by all who are to receive the benefits, *i. e.*, the government, the state and the landowners.

The plan is to construct strong levees on each bank of the river so as to make the channel carry all the water possible with safety. To construct concrete weirs at selected points through which the excess waters will be discharged under control. To construct artificial channels through the basins of ample dimensions to carry the waters turned out of the river. To bring all of the waters together at the outlet of the valley, and to enlarge the outlet so as to freely discharge the accumulated waters without "backing" them up in the channels above.

The cost of the works as planned was estimated at $33,800,000, and it was recommended that the government pay one-third and the state two-thirds. In alloting two-thirds of the cost of the work to the state it was thought that it would be equally divided between public appropriations and assessments upon the lands benefited by permanent reclamation.

The report was transmitted to the House of Representatives on June 27, 1911, and two days later referred to the Committee on Harbors and Rivers.

An extra session of the legislature being called to consider other matters, the Governor included in his proclamation commendation of the commission's flood control project for consideration.

By an act approved December 24, 1911,[1] the report of the Debris Commission was approved with such modifications and amendments as might be found advisable as a plan for controlling the flood waters, improving navigation and reclaiming the overflow lands.

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[1] Chapter 25, Statutes, extra session, 1911.

Thus, for the first time in the long history of this matter, did the state of California adopt a policy and commit itself to a definite method of procedure. In addition to approving the report of the commission the act created a State Reclamation Board to carry the project into effect so far as concerned the state's share.

This board was given jurisdiction over any plan of reclamation undertaken on the Sacramento and Feather rivers in order that such plans should not conflict with the flood control project as approved or to be modified and amended by the board. The State Engineer was directed to procure data and make such surveys as might be required to enable the Reclamation Board to prepare details for the proposed plans.

The adoption of a settled policy of state control over reclamation and flood control in a way that gave promise of absolute protection greatly stimulated individual effort along those lines. Indeed, so actively did private interests enter upon the reclamation and so diligently did they prosecute extensive plans, approved by the Reclamation Board so as to not only avoid encroaching upon the Debris Commission plan, but on the contrary to form part of those proposed works, it was soon found that a great deal of the public work planned by the commission was being done by private enterprise, making it possible to eliminate much of the cost estimated in the commission's report of 1910. Thereupon, the Committee on Rivers and Harbors of the House of Representatives on December 2, 1912, requested the Board of Engineers for Rivers and Harbors to review the report embodied in H. R. Document No. 81, 62d Congress, and to report subsequent information and conclusions thereon.

In compliance with that request the Debris Commission reported February 8, 1913, giving account of the tremendous development above mentioned and the great progress made toward accomplishing the end sought in its former report. The commission estimated that in view of what had been accomplished and the work already planned by private enterprise, the joint governmental costs to complete the works for the control of debris and floods and improvement of navigation according to the plans contemplated in its 1910 report would be $11,717,000, not including the $800,000 appropriated jointly for work at the mouth of the river, and not including costs for rights of way.

The commission recommended that one-half of the estimate, or $5,858,500 be paid by the United States and the other half by the state, and that all rights of way be furnished without cost to the United States. It will be seen from the above stated figures that the national government's share of the cost has been reduced nearly one-half. The land owners, however, will not be so fortunate, since they are expected to procure the rights of way and the price charged for the land to be taken will far exceed the prices considered in the original estimate.

The $800,000 mentioned above as having been formerly appropriated jointly by the United States and the state was for initial work in enlarging the mouth of the river as recommended in a preliminary report of the Debris Commission made in 1907. Making the mouth of the river larger is a necessary part of the adopted scheme as foreseen in the preliminary report and incorporated in the subsequent reports.

With the funds appropriated two large suction dredges, the *Sacramento* and the *San Joaquin*, were built, and have been operating since the summer of 1913, with funds appropriated from time to time by both congress and the legislature.

The necessity for enlarging the mouth of the river in advance of the completion of the controlling works in the valley above is apparent upon consideration of the physical conditions existing. It was stated that the measured flow of floods has exceeded 600,000 second-feet, and that quantity was used as a basis for the works planned by the Debris Commission.

The greater portion of that vast volume of water was spilled by the river into the basins, which became, then, regulating reservoirs, holding back the floods so they traveled but slowly down the valley. The construction of works to direct that water into unobstructed channels will increase the rapidity of its progress and bring it all together at the outlet.

Before work of enlargement began, the width of the river between Bakers Point on Sherman Island and the Montezuma hills was only about 750 feet with a cross-sectional area of about 33,000 square feet. So long as the waters were held back in the basins and fed out gradually they could escape through the contracted way, but when given quick transit to the point of exit so small an opening would cause disaster to all adjacent country.

The work accomplished has been the moving back of the levees on Sherman Island and the excavation of a channel across the chord of Horseshoe Bend below Rio Vista. The effect of this work is noticeable in the rapidity of current in the river above, even as far as the city of Sacramento. The operation of the dredges is in the hands of the Debris Commission, and details thereof will be found in the report of the commission to be found at the close of this article.

The surveys and investigations made for the Reclamation Board showed that complete control of Sacramento River could not be effected until the floods of the San Joaquin were also brought under subjection.

The act establishing Sacramento Drainage District and creating the Reclamation Board was amended in 1913 (chapter 170, statutes 1913), enlarging the district to embrace the San Joaquin overflow region up to Fresno County, naming it Sacramento and San Joaquin Drainage District, and enlarging the Reclamation Board from three to seven members.

The State Engineer is directed to gather data, make surveys and investigations for the formulation of plans for the improvement of navigation and the reclamation of lands subject to inundation in both valleys.

The enlarged district lies in fourteen counties and embraces 1,726,553 acres.

SAN JOAQUIN VALLEY FLOOD PROBLEMS.

The area of the San Joaquin Valley is more than twice that of the Sacramento Valley, and the San Joaquin River has many more tributaries from the Sierras than has the Sacramento. The aggregate quantity of water furnished by the San Joaquin and its tributaries, however, is much less than that furnished by the Sacramento. The average annual run-off reaching the Sacramento Valley is 27,000,000 acre-feet, while that of the San Joaquin is a little less than 14,000,000 acre-feet.

The maximum recorded flood flow of the Sacramento exceeded 600,000 second-feet and estimates of unmetered floods require plans for works to care for 800,000 second-feet, while the records of maximum flood flows in the streams entering the San Joaquin Valley aggregate 325,000 second-feet. Moreover, topographic conditions divide the valley into three districts, each having its own flood areas and only in exceptionally high floods do they unite their waters.

Unlike the Sacramento, the San Joaquin River occupies the trough of the valley, and has not built up a ridge in its course to create basins at the side. The inflowing streams from the sides, however, have built up delta cones, which meeting from opposite sides form ridges across the valley, thus dividing it into basins.

The general shape of the valley is that of an elongated ellipse, extending from the foot of Tehachapi Mountains in a northwesterly direction to a junction with the Sacramento Valley at the confluence of the two rivers, the dimensions being about 270 miles in length and 20 to 60 miles wide, and embracing 7,500,000 acres as against 3,500,000 acres in Sacramento Valley. About two-thirds of the valley lies on the east of the trough, and one-third on the west.

Several streams fed by the snows of the Sierras enter from the east, but those on the west having their origin in the low arid Coast Range furnish no considerable amount of water to the San Joaquin River.

Kern River enters from the east some 30 miles from the extreme head of the valley. It has built a delta cone entirely across the valley to the foothills on the opposite side and formed a basin within which its waters are impounded. The lowest bottom of the basin is marked by Kern and Buena Vista lakes. When excessive floods have filled the basin to overflowing the waters flow northward in Buena Vista Slough.

Kings River enters the valley some 75 miles from Kern River. This stream has built a large cone into the valley which, meeting a similar one from Los Gatos Creek on the west, has formed a ridge which creates a basin south of it of which Tulare Lake is the bottom. The summit of this ridge is about 30 feet in elevation higher than the bed of Tulare Lake at its lowest point and some 60 feet higher than the bed of San Joaquin River to the north.

San Joaquin River, entering 20 miles* north of Kings River, runs in a course perpendicular to the axis of the valley 30 miles or two-thirds of the way across, where it turns abruptly to the right and continues thence in the trough of the valley.

Thus it is seen that Kern and Kings rivers deliver their waters into separate basins presenting separate problems of control from those of the San Joaquin River to the north.

Although each section has the problem of protecting its lands from its own waters, San Joaquin is menaced by the occasional filling of Tulare Lake to overflowing and discharging its floods into the swollen waters of San Joaquin, and likewise Tulare Lake floods are augmented by the escaping waters of Kern Lake basin. Furthermore, both Kern and Kings rivers sometimes divide before reaching their respective basins, and by delta channels discharge part of their floods over the ridge into the adjoining territory—Kern River into Tulare Lake and Kings River into San Joaquin, and if Tulare Basin is already full when Kern River water reaches it that water then adds its volume to the water flowing into the San Joaquin.

It has been stated that investigations for the Reclamation Board showed that complete reclamation and flood control of the Sacramento Valley could not be effected without also controlling the waters of the San Joaquin.

From the above discussion it also appears that flood control works on the San Joaquin must be constructed to care for additional waters from Kings River and Tulare Lake as well as some from Kern River, and that any scheme for flood control and reclamation in Tulare Lake basin must also consider the necessity of providing against injury from the excess waters of Kern River.

The correlation of all the problems presented, and their correct solution by the design and erection of works adequate to reclaim and render safe against floods of more than 3,000,000 acres of valuable land with its hundreds of homes, and a score of cities and towns, does not appear to be possible excepting through the agency of a single directing body with large powers.

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*All of these distances are air-line measurements, scaled from the map and are only approximate.

The state has been for years gathering data which will be useful in devising a comprehensive flood control project for the San Joaquin Valley.

Some years ago civic bodies in the valley induced the United States congress to appropriate funds for investigating the feasibility of restoring navigation on the San Joaquin River. That appropriation in the sum of $32,277.50 was made in 1912, and coupled with the provision that the state should furnish an equal amount. There being no appropriation available, the Department of Engineering joined with the United States army engineers, and allotted the sum of $32,277.50 from its funds to meet the government appropriations, making a fund of $64,555 for the purpose.

Surveys and research were made, covering the topography of the valley subject to inundation, the stream flow of the river and its tributaries, the possibility of increasing the summer flow by means of storage, the feasibility of providing navigation by dams and locks, and all other subjects relating to canalization, as well as the control of floods in aid of navigation. The studies made in connection with the survey extended to the partial consideration of Kings River and Tulare Lake and their relation to San Joaquin River.

The Department of Engineering in its general studies of the subjects of canalization, irrigation and reclamation, apart from the specific subject just mentioned, has collected considerable data concerning conditions affecting Tulare Lake and has extended its research to the flood waters of Kern River reaching the lake.

All of the data collected by both the above named agencies are being analyzed and studied by this department in connection with its work with the Reclamation Board for the Sacramento and San Joaquin Drainage District.

If the plenary powers possessed by the Reclamation Board concerning the affairs of the Sacramento and San Joaquin Drainage District were extended to the territory against whose assaults defensive works must be designed, it would result in complete correlation of all interests, the equitable division of costs, and the ultimate construction of one comprehensive system of works insuring safety to 2,000,000 acres of fertile land, and hundreds of miles of navigable channels extending through a territory as large as either the kingdom of Holland or of Belgium.

While this report can not with propriety forecast the recommendations to be based upon the investigations made in cooperation between the army engineers and the state, under the joint appropriations above described, the department's independent research warrants the belief that when navigation shall be developed throughout the interior to the fullest extent attainable at cost commensurate with the benefits to be derived *all debris-carrying flood waters will be excluded from ship channels.* Such exclusion can be accomplished in the San Joaquin Valley at least as far up as Stockton by a system of by-pass channels through the delta regions.

The further discussion of this phase of the subject will be resumed herein in another chapter devoted to navigation.

The details of engineering work in connection with the operations of the Sacramento and San Joaquin Drainage District it is not considered necessary to recite here, but their description is left to be set forth by the Reclamation Board in its report of its administration.

FLOOD PROBLEMS OF OTHER STREAMS.

Nearly every stream which traverses populated territories, whether large navigable rivers or intermittent streams flowing only a part of the year, at times visits danger and destruction upon the communities along its course.

The Colorado River, from the waters of which the great Imperial Valley is irrigated, in 1904 forsook its channel to the Gulf of California and created havoc and destruction in its way to Salton Sea. The task of changing it back to its old course required several years of continuous effort and the expenditure of millions of dollars.

The efforts of Imperial Irrigation District have at last resulted in complete control of the Colorado with works that give promise of permanence and efficiency.

Los Angeles and San Gabriel rivers have both been on the rampage several times within the last few years, doing damage amounting to many millions of dollars.

The Santa Ana has also contributed to the destruction of lands and orchards which its waters in their benign moods have created.

The San Diego, Sweetwater and Tia Juana rivers and in fact all of the streams of San Diego County a few months ago were filled with unprecedented floods, washing out railroad and highway bridges and doing a vast amount of other damage.

In the northern part of the state, Mad River and Eel River, both in Humboldt County, have from time to time risen in their might, and in addition to carrying away bridges and houses have attacked the rich lands along their banks, washing whole farms into the sea. These streams with their steep gradients and swift currents, great redwood trees riding the flood waves, attack all protective works with well-nigh irresistible force. Only the most substantial bulwarks can resist the blows of those huge battering rams.

There are several laws under which communities may organize to construct protective works. Two or three forms of reclamation districts are provided, flood protection districts may be organized, but all are for action upon a unit basis.

Experience has abundantly proven that when a given community shall effect its own protection that very fact often constitutes a menace to other communities. The reclamation of a body of land over which flood waters are accustomed to flow necessarily compels those waters to go elsewhere. As other reclamations are completed the waters become more and more concentrated, the flood plane is raised, requiring higher and stronger levees to be built by the first as well as the new reclamationists. The water being held in confined channels rushes with greater speed and volume to lands below, to the destruction of any feeble works that may have been erected and rendering reclamation impossible.

Every problem of flood control must be worked out according to the conditions present, and always with reference to its effects upon others. If a given community can effect protection for itself without affecting others outside its boundaries, it should have absolute autonomy in all its affairs. But if its methods shall result in injury to persons or property outside its territory, then those threatened with injury must be protected, and the contemplated works so planned as not to damage the neighbors.

It would seem as though all reclamation and flood protection schemes might be conducted under one law better than under so many, and it is hoped that the Water Problems Conference will present to the coming legislature recommendations for simplifying the laws and placing the matters on a common-sense, workable basis.

TULARE LAKE FLOODS.

The close relations existing between the flood problems of the San Joaquin River and of the Tulare Lake and Kern River basins has led the Department of Engineering to devote special study to the latter. Records of stream flow measurements have been kept jointly by the department and the United States Geological Survey for many years. These measurements are made at the mouths of the canyons where the streams enter the valley and do not indicate what becomes of the water after it passes the gaging stations, excepting that stations have been maintained at Tulare Lake from which a record is obtained of the fluctuation of that body.

Kings River.

From notes in the Department of Engineering the following description of early conditions on Kings River are compiled:

This stream debouches from the mountains near Centerville, about 25 miles east of the city of Fresno, and for 25 miles runs between banks 20 to 50 feet high. Near Kingsburg the banks diminish, and thence begins the delta fan built by the waters of the river. This fan, its apex at the miniature gorge just described, spreads downward toward the central trough and left and right over the plains. It is this fan meeting a similar one built by the waters of Los Gatos Creek opposite, which forms the ridge dividing Tulare Lake from San Joaquin River.

In the early days of settlement in this region the channel of Kings River was well defined all the way to Tulare Lake. In the upper portions of the delta the branch channels were small and carried but little water. A survey of the lands lying in the delta and west and north of the main river was made by the United States Surveyor General in 1864, and the meander line ran along the right bank of the river from just below where Kingsburg is now, necessarily crossed all streams branching off toward the west. According to the notes of this survey, Cole Slough, which now carries all of the summer flow and the major part of flood, did not exist. A short distance farther down the river a small channel branched off and ran west, but it was only a small channel. The same with all other channels branching off.

The survey followed the river to its confluence with the San Jose Slough and thence ran northwest to Summit Lake. Thence the course of the survey was northeasterly across the swamp and it is notable that no streams or channels were noted where the line now crosses North or Beall Slough, nor was any other channel discovered in a distance of several miles and reaching beyond the swamp meander line. This is only cited as corroborative of the claim which is made with the force of conviction that in those days all of the low and medium flows and nearly or quite all of the flood waters of Kings River flowed south to Tulare Lake and it was only when the lake had filled to overflowing that water from Kings River ran into the San Joaquin, and then only after mingling with the waters of Tulare Lake.

The most easterly branch of the river which diverted flood waters was Burris Slough which diverted from the left bank three or four miles down the "fan" from the present head of Cole Slough. This channel was one of the earliest of those running south to be closed by man, and water prevented from running in it. This was done about 1873. Mussel Slough, some three miles farther down, was converted into a ditch and a headgate placed in it. The headgate becoming decayed and the ditch having ceased operations, a dam was constructed across, effectually closing it. In the meantime, levees had been built across all depressions by which high water could escape. Leinberger Slough was put under control as a heading for a ditch, as also Carothers Slough, which became the intake of Rhoads Ditch. Both Leinberger and Carothers sloughs returned to the river several miles below and before it reached the lake, but the others had originally run to the lake without again reaching the parent stream.

As previously stated, Cole Slough is the first branch from the river. The original Cole Slough was very small, but the flood of 1867 opened up the present channel about a quarter-mile upstream. It has been enlarged by each recurring flood until now it is by far the larger channel.

Several miles below its head where the slough approached near to the river a settler had built a fence of poles and stakes with a ditch alongside to render it a greater barrier to stock. During the floods the water found this ditch and quickly enlarged it until now it is several hundred feet wide and several feet deep. It is called Dutch John Cut.

Murphy's Slough, a branch of Cole Slough, approaching within a few rods of the river at one point a mile or two above the present town of Laton, broke back into the river. The channel thus made, called Reynolds Slough, has long been controlled by a gate in it.

Some four or five miles below the old deserted village of Kingston, founded in the "fifties" at Bliss Ferry where traffic crossed the river to follow the old overland route to Texas, a channel branched off and ran west. It was known as North Fork. This stream was reported by the survey of 1864, heretofore referred to as being about 80 or 90 feet in width on top, if memory serves correctly. It ran straight west for some distance and then bearing toward the northwest must have discharged water, when it carried any, into the San Joaquin through Fish or Fresno Slough. It was closed off with a dam, however, in 1865 or earlier.

After the North Fork was closed, J. G. James, who owned a large tract of land along Fresno Slough, constructed a ditch diverting from the river about two miles above the head of North Fork and conveyed water to the west. In 1879 or 1880, the headgate in the James canal was washed out and another constructed. This was soon wrecked and then the owners of the "Grant" as the rancho on that side of the river is called, filled in the head of the canal.

About 1½ miles below the closed head of the North Fork another canal, called the Zalda, was constructed, running west. The flood of 1879 washed around the headgate in this ditch and considerably enlarged the canal below. About half a mile below the head of the Zalda canal, the Crooked Slough diverted on the opposite side of the river. This slough rejoined the river several miles below, but its head was used as the intake of the Rhoads ditch. A brush dam was maintained in the channel of the river to force low water into the head of Rhoads ditch.

In the spring of 1884, the highwater washed the headgate out of Zalda canal, and again enlarged that channel. At the same time, or perhaps subsequently, the Rhoads dam, checking the water in the river, caused that channel to fill completely with sand and debris, shutting off all flow to the south and making the Zalda canal the only river. The course of the Zalda canal toward the west crosses many swales and depressions, all running toward the south, and when the canal became the river, which, notwithstanding its enlargement, was unable to carry all the water, it spilled over in the low places and the water found its way to San Jose Slough and thence back to the old river channel several miles below and thus into Tulare Lake. Some of these escapes soon cut out quite large channels leading south. One or two of them terminated in the shallow basin on the summit of the divide hereinbefore referred to as Summit Lake.

The original Zalda ditch very probably terminated in Beall Slough, which was a more or less defined channel traversing the swamp in a northwesterly direction and finally reaching Fresno Slough. The Zalda channel now loses its name and becomes known as Beall Slough.

Shortly after the river changed its course the people interested about its mouth, finding the channel completely filled for half a mile and concluding that to clean it out and restore it to original condition would be too expensive, excavated a narrow cut between the Zalda channel and the river, thus turning some water down their way. This excavation, however, was never made to the same depth as the Zalda. This cut was wholly on the lands of the "Grant" and having been made without authority of the owners, the "Grant" people immediately constructed a headgate in it and secured an injunction from the courts restraining the other people from interfering with the headgate or enlarging the cut. The injunction was later modified permitting the lower-river people to have some of the bottom flash boards removed, but the floor of the headgate remains higher than the bottom of the Zalda channel. Several things now combined to keep the major part of the water running west. The maintenance of the flashboards in the headgate; the higher elevation of the bottom of the cut; the lodgment in the throat of the cut of a large drift of logs and brush which was allowed to remain there, retarding flow into the cut.

Whereas formerly all of the low water naturally ran south, the result of the several conditions enumerated was that all of the low water ran west so that it required something like 700 second-feet before any would run down the old river through the cut. A portion of this water would run into Summit Lake and when that basin had become full it would overflow and run into Tulare Lake. The owners of the "Grant" constructed canals diverting from the Zalda to irrigate their lands on the "Island" the triangular shaped tract of land lying between the river on the east, San Jose Slough on the west and Zalda canal on the north, comprising some 10,000 or 12,000 acres.

For many years the conditions stated caused a division of the water to be such that about one-third to one-half of the lower flows would reach Tulare Lake. Then when the spring freshets came about one-third would run through the cut, two-thirds west in the Zalda and about one-half of the Zalda water would be returned through Summit Lake and San Jose Slough to the river to be conveyed to Tulare Lake.

In 1903 the "Grant" constructed a levee along the south side of the Zalda, closing off nearly all of the channels and depressions that had formerly taken its surplus water to the south. One or two were left open and up to about 1912 or 1913 ran some water into Summit Lake.

In addition to the levee which has retained more water in the channel, a great deal of work has been done in the channel itself, or at least in the Beall Slough portion, all of which it is claimed, and apparently the claim possesses logic, that the Zalda has constantly increased in capacity until now it carries all of the water at low and medium stages and from 65 per cent to 80 per cent at any stage. Originally, and up to the scouring out of the old Zalda ditch and the choking of the main river the flow was the other way—all the low water ran south, else James would not have built his canal many miles in length nor would the Zalda ditch have been constructed excepting to obtain water that otherwise would not run west.

In times of flood the river overflowed its banks all along both sides, and old Cole Slough carried water to the west, filling up the low lands north of Laton. This water was drained off, partly into the river again by Reynolds and other sloughs, partly by Murphy's Slough, which continued westward and undoubtedly contributed some to the Fresno Slough and San Joaquin. On the opposite side surplus water found outlets in Burris, Mussel, Wilson and Leinberger sloughs. Further along the by-channels became more numerous. On the south side were Carothers, Crooked, Green, Button Willow and a score of other streams, named and nameless, making a complex network of channels. As the country became settled these sloughs were closed with dams or headgates to protect and reclaim the lands, as all of the lands traversed by them below Kingston were swamp and subject to acquisition upon being reclaimed from overflow.

TULARE LAKE.

Tulare Lake was described in the school books of fifty years ago as being ''the largest body of fresh water west of the Mississippi River, 60 miles long, 30 miles wide and of unknown depth.'' The surface dimensions stated were not far wrong. Taking the margin of the lake as meandered by the government surveys in 1852–54, the area was about 800 square miles. At that time the lake was full and the waters ran over the ridge into the San Joaquin River. Its greatest depth was about 35 feet.

The survey of swamp meander lines was made in 1852–53–54 following the flood of 1852, so that the line probably indicates very closely the extreme highwater mark.

It is known that the lake has long been subject to great fluctuations in area and depth, filling to overflowing at times of great floods and shrinking to little or nothing when its supply was diminished by a series of dry years. History records floods in the state in 1852, 1862, 1867, 1879, 1884, 1907 and 1909. Indian tradition indicates that 1805 and 1833 were also years of extraordinary high water. According to legend the quantity of water in the Kaweah River in 1883 was much greater than any flood has produced since.

The Indians had traditions, too, that their fathers had walked across Tulare Lake dry-shod. Evidences of Indian habitation at points on the bed of the lake show that the margin of the water had remained for some considerable periods at different elevations. Hieroglyphics on rocks in the foothills east of the lake have been interpreted to read that the people were compelled to emigrate from the lake region because all the fish had died and the people had gone to the mountains for food. To this day when the lake waters recede to a small quantity enormous quantities of fish die in the stagnant pools.

The fluctuating of the lake from full to dry and back to full again is an old story being repeated at irregular intervals, and no one need hope to effect permanent reclamation of any portion of the lake bed until it is all reclaimed under one comprehensive scheme, which scheme must involve the control of the flood waters of the streams whose waters make the lake.

The flood of 1867 was the last to fill the lake to overflowing, and about 1870 the waters began to recede, never regaining their former lines. The entire area embraced within the government meanders was granted to the state under the Swamp and Overflow Land Act of 1850. As the water receded the uncovered lands were taken possession of under the provisions of reclamation laws.

Under these laws one could buy from the state in tracts of 640 acres, later reduced to 320 acres, at one dollar an acre, by paying 20 per cent down. The remaining payments could stand indefinitely. The purchaser could obtain letters patent to the land upon paying the remaining 80 cents an acre. Should he elect to reclaim his land from its overflow condition, upon presentation of proofs satisfactory to the county board of supervisors that it was reclaimed, he not only obtained title but his payments were refunded to him. He could make the reclamation alone or join with his neighbors in a district.

Many districts of all sizes were formed on the bed of Tulare Lake, ranging from 640 to 50,000 acres. Levees were built to keep off the waters. Most of these efforts were honestly intended, though many were frauds. Instances occurred where proofs were tendered and allowed, that lands were ''reclaimed'' when the extent of reclamations was a backfurrow run around the land with a ten-inch plow. Perhaps, since the water of the lake was several miles distant, such a claimant eased his conscience by the reflection that his backfurrow was sufficient for protection against overflow from a *dry lake.*

The gradual diminishing of the lake area continued with seasonal fluctuations until in 1898 the bed was nearly dry and a large part under cultivation to wheat, barley and alfalfa. Then came a series of prosperous years to the settlers. Farms were established and improvements erected all over the lake bed.

In 1901 the water came and flooded a large area, but again subsided, and in 1905 the lake bed was again entirely dry. But disaster was due, and on March 15, 1906, water again found its way to the lake, and by June 200 square miles had been inundated, a very large proportion of which was again in growing grain, which before the advent of the water gave promise of a ''bumper'' crop.

The remarkable flatness of the lake bed may be realized when it is remembered that at a depth of two feet, 60 square miles are covered with water, and is practically without slope in any direction.

In June, 1906, Kern basin overflowed and reached the lake through Buena Vista Slough. This was said to be the first time in more than 25 years that Kern River water had flowed into Tulare Lake. Other streams which had not reached the lake for many years contributed, and by August, 1906, the water had reached a maximum depth of 12.7 feet and an area of nearly 300 square miles. The water slightly receded the following months, but rose in the spring of 1907 to the highest stage recorded in recent years, when it reached a depth of nearly 14 feet. It began falling at once, however, and in November of that year a careful survey found the lake had an average length of 20 miles, width 13.5 miles, depth 12.4 feet and area 274 square miles. In December, 1908, the water had receded to 8.3 feet depth, rose to 13 feet in June, 1909, and stood practically still during that summer, declining to 9.35 feet in December, 1910.

Looking forward to the time when all of the interests involved will be united to secure immunity from devastating floods the department has been putting forth extra effort to obtain data that would be useful in solving the problems of reclamation and flood control in the Tulare Lake region.

During the spring of 1916, Mr. J. B. Brown, hydrographer, was detailed to make investigation of conditions affecting reclamation in Tulare Lake basin, and his reports thereon are here presented, practically verbatim:

Flood Conditions of Tulare Lake, 1916.

This report is a summary of the field investigations of certain streams of Tulare Lake basin for the year 1916. The heavy rains of January, 1916, in the southern part of the San Joaquin Valley swelled the streams draining into Tulare Lake to their maximum capacity. Instead of being flash floods the flows were well sustained and by March 1st it became evident that considerable land in the lake bottom was in danger. These conditions led to the setting aside of funds for the purpose of studying stream flows with an idea of using the data thus obtained for the future planning of a comprehensive flood control scheme for the whole basin.

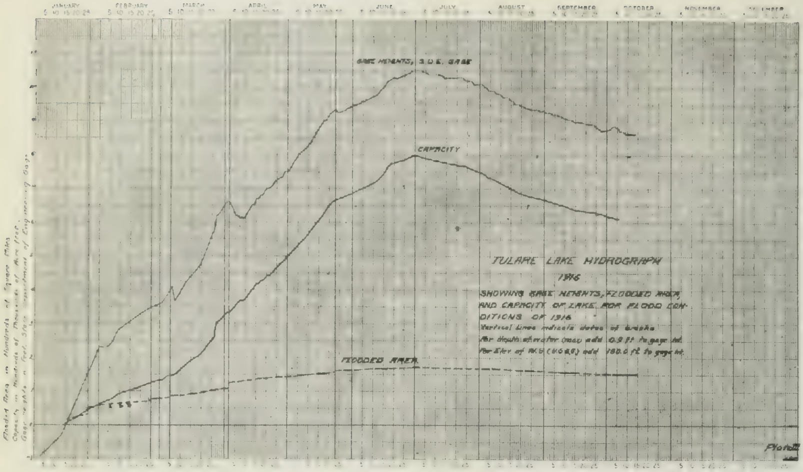
The State Department of Engineering commenced field work on March 23d, by establishing gaging stations on Buena Vista Slough, Tule River and the three channels of Cross Creek. Investigations on the flows of the South Fork of Kings River had been in progress since 1914 and a fair rating station was already in operation.

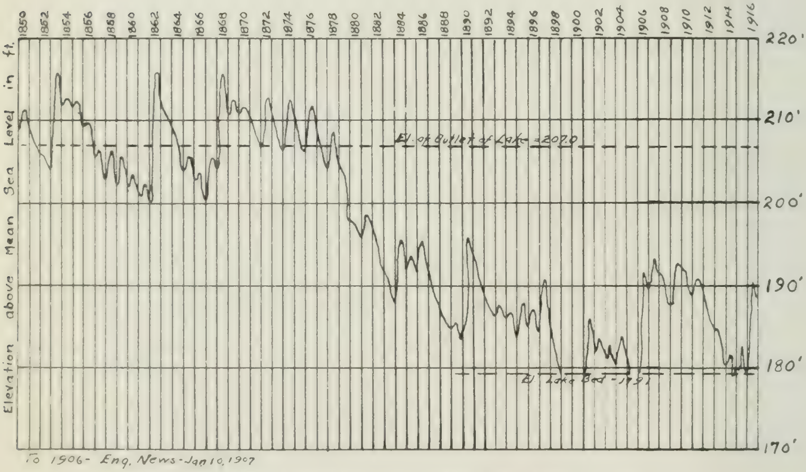
Description of Tulare Lake.

Geographic. Tulare Lake is a broad, shallow basin occupying the lowest depression of Tulare basin. It lies in Kings County about 30 miles south of Fresno and 40 miles northwest of Bakersfield. The lake bed resembles a large flat saucer, the lowest point of which is 179.1 feet above sea level. A map has been prepared from public and private data showing the topography of the lake bottom.

Hydrographic Data. Tulare Lake is fed by the waters of four of the principal rivers south of the San Joaquin River, viz: the south branch of Kings River,

PLATE X.





FLUCTUATIONS IN DEPTH OF TULARE LAKE, 1850 TO 1916.

Kaweah River, Tule River and Kern River. Kaweah River reaches the lake through the various branches of Cross Creek, Cameron, and Packwood creeks and Elk Bayou, The excess over diversions of Kern River is ordinarily stored in Buena Vista Lake, but in seasons of exceptional flow surplus water from Buena Vista Lake is discharged into Tulare Lake through Buena Vista Slough. Kaweah and Tule rivers are the only streams wholly tributary to the lake. In former times Kings River contributed all or nearly all of its flood flow to the lake, but in recent years its course has been so altered by artificial means as to send most of its flood waters to the San Joaquin River through Fresno Slough. Interests owning lands along Fresno Slough have changed the course of the river so that they might obtain irrigation water during the summer months. While this work has been beneficial so far as flood conditions in Tulare Lake are concerned, it has also been detrimental to those lands lying on the southern slope of the Kings River delta in that it has greatly reduced the amount of water available for the irrigation of those lands.

Kern River rarely has sent any water to Tulare Lake in recent years. It is said that for 25 years previous to 1906 no water from Kern River entered Tulare Lake. In that year Kern River water reached the lake in the latter part of June and continued to flow until late in the summer. In 1916 the flow from Kern River reached the lake about January 31, 1916, and continued until after August 1st, following.

The depth of the lake has fluctuated between dry and about 37 feet. The following data is taken from the map of San Joaquin Valley, 1886, by Wm. Ham. Hall and describes the fluctuations of the lake surface from 1852 to 1886:

Fluctuations of the Lake's Surface.

"High water of 1852 is known to have been as great as that of 1862. At low water of 1861 the surface stood about 204 feet above low tide in Suisun Bay. At high water 1862, it rose to 220 feet. Thence it receded to about 206 or 207 feet. High water of 1868 the surface was at 219.6 feet. Low water of 1871, 210.7. High water of 1873, 216.6.

From 1873 to 1883 the waters gradually receded with 2 to 4 feet annual fluctuations to the low water of 1883, which was 192 feet—the lowest known.

From 1883 there has been a gradual rising, with annual fluctuations, until at high water of 1886 it was about 200 feet above the reference plane.

The extreme fluctuation known is, hence, about 28 feet.

The area at highest water (elevation 220 feet) was 760 square miles.

The area at lowest water (elevation 192 feet) was 195 square miles.

The area at time of Creighton Survey, 1880 (elevation 208 feet), was 445 square miles."

The reference plane of Wm. Ham. Hall's map was the old State of California Datum and is about four feet below the United States Geological Survey datum used on the map accompanying this report.

Summarizing the fluctuations of the lake level and reducing them to mean sea level we have the following:

Year	Wm. Ham. Hall elevation	Mean sea level elevation	Depth	Area, square miles
1852	220	216	36.9	760
1861	204	200	20.9	------------
1862	220	216	36.9	------------
1867	206–207	202–203	22.9–23.9	------------
1868	219.6	215.6	36.5	------------
1871	210.7	206.7	27.6	------------
1873	216.6	212.7	33.6	------------
1880	208	204	24.9	445
1883	192	188	8.9	195

A record of the fluctuations of the lake surface from 1906 to date is shown in Plate I. This record was compiled from United States Geological Survey reports. Plate II shows the fluctuations from 1850 to 1916.

1916 Flood.

History. The heavy rains of January, 1916, caused flood stages in all streams of the state and particularly high stages in those streams at the southern end of the San Joaquin Valley. On January 17th, Kings River reached an instantaneous maximum flow of 45,000 cubic feet per second, with a mean daily flow of 28,500 second-feet. Kaweah River discharged 9,600 second-feet on the same date, while on the 18th Kern River had a mean discharge of 16,100 second-feet. Later in the month these streams were again at flood stages and high rates of flow were maintained during February and March. The heavy discharges during April, May and June exceeded those of the earlier months, being augmented by the melting snows.

The first water of the season was from Kings River and reached the lake on January 20th. Kaweah River and Tule River waters reached the lake immediately afterward, while overflow from Buena Vista Lake reached Tulare Lake about February 1st.

In November, 1915, the flooded area in the bottom of the lake amounted to only 6.6 square miles, none of which was included in so-called reclaimed territory.

With the rise of the water successive reclamation levees were overwhelmed. Breaks occurred with each high wind until by midsummer but two districts remained intact, El Rico Land Company and G. A. Smith Reclamation District, with the western part of the Lovelace District barely holding against the water. About October 1st the Smith District levees failed, leaving only El Rico and part of the Lovelace District out of water. Of all the reclamations in the bottom of the lake these two survived and they only by incessant vigilance and tremendous effort.

The dates breaks occurred and areas flooded thereby are as follows:

January 26, 1916—
  12 sections T. 21 S., R. 20 E.
  9½ sections T. 22 S., R. 21 E.
 Reclaimed land flooded-- 13,720 acres

February 25th—
  7 sections T. 21 S., R. 19–20 E.
 Reclaimed land flooded-- 4,480 acres

March 5th—
  Goldberg & Barbour District.
  6 sections T. 21 S., R. 20 E.
 Reclaimed land flooded-- 3,840 acres

April 2d—
  Lewis Reclamation District.
  T. 21 S., R. 21 E.
 Reclaimed land flooded-- 14,000 acres

May 23d—
  Part of Lovelace Reclamation.
  T. 21 S., R. 21 E.
 Reclaimed land flooded-- 2,370 acres

October—
  G. A. Smith Reclamation.
  T. 21 S., R. 19–20 E.
 Area flooded --- 1,920 acres

  Total reclaimed land flooded, 1916---------------------------- 40,330 acres

From the map above referred to studies of the storage, or holding capacity, of the lake at different depths has been made.

The map below the 190-foot contour is based on Neilson's map of Tulare Lake bed, and above that line is based on Wm. Ham. Hall's map of the San Joaquin

Valley, 1886. Contours on the west side of Buena Vista Slough are based on elevations determined by a survey conducted by the Kings County Development Company.

Two gages on Tulare Lake were established by the State Department of Engineering. Both were located on the property of El Rico Land Company, one known as the "Point" gage being located at the northwest corner of section 3, T. 22 S., R. 21 E., and the other known as the "Headquarters" gage was located on the north line of section 2, of the same township and range and in the Tule River canal. The elevations of the zeros of these gages was practically 180.0 feet. Both gages were read until the "Point" gage became submerged. The records were carefully kept and promptly reported by the officials of El Rico Land Company.

Tables of capacity of the lake for various flood conditions were compiled, as follows:

Capacity of Tulare Lake.
Natural Ground—No Reclamations.
Capacity of Unreclaimed Land—Tulare Lake.
Capacity of Reclaimed Land—Tulare Lake.
Capacity Table—Tulare Lake—Jan. 26–Feb. 25.
Capacity Table—Tulare Lake—Feb. 25–March 5.
Capacity Table—Tulare Lake—March 5–April 2.
Capacity Table—Tulare Lake—April 2–May 23.
Capacity Table—Tulare Lake—After May 23.

TABLE No. 1.

Capacity of Tulare Lake—Natural Ground; no Reclamations.

Contour	Area under contour, square miles	[1]Volume between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	35.40	47.24	14.15	9,050
181	59.08	70.76	61.39	39,300
182	82.45	91.28	132.15	84,500
183	100.12	108.60	223.43	143,000
184	117.08	126.44	332.03	212,500
185	135.81	143.86	458.47	293,500
186	151.92	161.67	602.33	391,000
187	171.42	180.32	764.00	489,000
188	189.21	198.77	944.32	605,000
189	208.33	220.58	1,143.09	732,000
190	232.83	238.64	1,363.67	873,000
191	244.44		1,602.31	1,026,500

[1] A square-mile-foot is one square mile covered one foot in depth and is equivalent to 640 acre-feet.

TABLE No. 2.

Capacity of Unreclaimed Land Tulare Lake, Use for Flood Conditions up to January 26, 1916.

Contour	Area under contour, square miles	Volume between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	14.64	20.64	4.39	2,810
181	26.65	32.74	25.03	16,050
182	38.83	42.98	57.77	37,000
183	47.12	51.76	100.75	64,500
184	56.40	60.37	152.51	97,600
185	64.34	67.74	212.88	136,400
186	71.15	74.53	280.62	180,000
187	77.91	79.98	355.15	227,500
188	82.06	84.32	435.13	279,000
189	86.57	90.14	519.45	332,500
190	93.70		609.59	390,000

TABLE No. 3.

Capacity of Reclaimed Land, Tulare Lake.

Contour	Area under contour, square miles	Volume between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	20.76		9.76	6,250
181	32.43	26.60	36.36	23,200
182	43.62	38.02	74.38	47,800
183	52.95	48.28	122.66	78.400
184	60.68	56.82	179.48	115,000
185	71.47	66.08	245.56	157,000
186	80.77	76.12	321.68	206,000
187	93.51	87.14	408.82	261,500
188	107.15	100.33	509.15	326,000
189	121.76	114.46	623.61	399,000
190	139.13	130.44	754.05	482,000

TABLE No. 4.

Capacity of Tulare Lake, January 26, 1916, to February 25, 1916.

Contour	Area under contour, square miles	Volume between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	27.44		10.98	70,000
181	41.05	34.24	45.22	29,000
182	56.91	48.98	94.20	60,000
183	67.44	62.18	156.38	100,000
184	77.66	72.55	228.93	146,500
185	85.70	81.68	310.61	199,000

TABLE No. 5.

Capacity of Tulare Lake, February 25, 1916, to March 5, 1916.

Contour	Area under contour, square miles	Volume between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	27.56		11.00	7,000
181	42.20	34.88	45.88	29,400
182	59.54	50.87	96.75	62,000
183	71.19	65.36	162.11	103,800
184	81.41	76.30	238.41	152,700
185	91.40	86.41	324.82	208,000

TABLE No. 6.

Capacity of Tulare Lake, March 5, 1916, to April 2, 1916.

Contour	Area under contour, square miles	Capacity between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	28.99		11.60	7,300
181	46.90	37.94	49.54	31,700
182	65.39	56.14	105.68	67,600
183	77.20	71.30	176.98	113,200
184	87.42	82.31	259.29	165,900
185	97.41	92.42	351.71	225,000
186	104.66	101.02	452.73	290,000
187	111.90	108.28	561.01	359,000

TABLE No. 7.

Storage Capacity of Tulare Lake at Different Depths, April 2, 1916, to May 23, 1916.

Contour	Area under contour, square miles	Volume between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	35.40		14.15	9,050
181	58.98	47.19	61.34	39,200
182	80.42	69.70	131.04	83,800
183	94.80	87.61	218.65	140,000
184	108.19	101.50	320.15	205,000
185	120.06	114.12	434.27	278,000
186	129.15	124.60	558.87	357,500
187	139.08	134.12	692.99	443,500
188	146.23	142.66	835.65	535,000
189	153.31	149.77	985.42	631,000
190	163.93	158.62	1,144.04	732,500

TABLE No. 8.

Capacity of Tulare Lake after May 23, 1916.

Contour	Area under contour, square miles	Volume between contours, square-mile-feet	Capacity up to contours, square-mile-feet	Capacity up to contour, acre-feet
180	35.40		14.15	9,050
181	58.98	47.19	61.31	39,200
182	80.77	69.88	131.22	84,000
183	95.74	88.26	219.48	140,400
184	109.69	102.72	322.20	206,100
185	122.06	115.88	438.08	280,200
186	131.65	126.86	564.94	361,000
187	142.04	136.84	701.78	448,500
188	149.60	145.82	847.60	542,000
189	156.92	153.26	1,000.86	640,500
190	167.63	162.28	1,163.14	744,500
191	173.97	170.80	1,333.94	854,000

In addition to the gages maintained by the State Department of Engineering the United States Geological Survey in cooperation with the department maintained its regular gage located on the north line of section 17, T. 21 S., R. 19 E.

The driving effect of the wind on broad, shallow bodies of water is very marked, and after a hard blow the water may be several inches higher on the lee side than on the windward side of the lake, hence the agreement between the two sets of readings taken on opposite sides of the lake is considered very satisfactory.

By reference to these tables the capacity and flooded area of the lake is readily ascertained and is also shown graphically on the accompanying hydrograph.

It will be seen from the hydrograph that the maximum amount of water in the lake proper for the flood conditions of 1916 was approximately 800,000 acre-feet.

Stream Flows.

From the record kept by the United States Geological Survey in cooperation with the Department of Engineering, tables of the daily discharges of the main tributary streams at the base of the foothills have been compiled. These discharges are shown on the accompanying hydrographs of Kings, Kaweah, Tule and Kern rivers. The Tule River shows the combined discharges of North and South Fork as measured at a point about nine miles east of Porterville. The Kern River record was furnished by the Kern County Land Company.

In order to measure the amount of water entering Tulare Lake from each of the above streams gaging stations were established near the lake margin.

On Kings River a station was established in 1914 at the Empire No. 2 Weir near Stratford. The station was rated and gage records kept for parts of the years 1914 and 1915. Careful gage records were kept for the entire flow of 1916.

Kaweah River water reaches Tulare Lake through the various channels of Cross Creek. On the map accompanying this report these channels are noted as East, Middle, and West channels of Cross Creek. Gaging stations were established on each of these channels, but the station records were not good and later in the season they were all affected by backwater from the lake. The contribution of Cross Creek (or Kaweah River) water to the lake has been estimated by comparing discharge measurements made on certain days with the discharge of the main river at Three Rivers for the previous day and applying the same proportion to the average flow of the main river for a considerable period to determine the amount contributed to the lake for the same period.

The Tule River station was located at the county road bridge on the east line of section 12, T. 22 S., R. 22 E. Good gage readings were taken at this station from April 1st to the end of the season. For January, February and March before the gage readings commenced the flow into Tulare Lake was estimated in a manner similar to that used for Kaweah River.

The station on Buena Vista Slough at Hart Station, NW¼ section 6, T. 27 S., R. 22 E., was established to measure the contribution of Kern River waters to Tulare Lake. The record of this station is very good. The gage was read daily from March 23 to July 29, when the water fell below the zero. Flow at this station stopped on August 5th. Several discharge measurements were made at this station and a good rating curve determined. The flow past Hart Station is estimated for the months of January, February and part of March. The estimated and measured quantities contributed by each of the main streams is shown on the hydrograph of that stream.

The following table shows the flow of water reaching Tulare Lake, expressed in acre-feet, for each month:

TABLE No. 9.

Monthly Flow of Water Reaching Tulare Lake in 1916, in Acre-Feet.

Month	Kings	Kaweah	Tule	Kern	Totals
January	23,100	*45,800	*38,300		107,200
February	11,400	*29,000	*34,500	*72,000	146,900
March	26,800	*50,800	*53,100	150,000	280,700
April	19,300	*27,600	4,860	219,100	270,860
May	46,700	*26,000	3,000	234,400	310,100
June	53,800	*22,800	270	162,100	238,970
July	5,050	*10,500		89,800	105,350
August				2,480	2,480
Totals	186,150	212,500	134,030	929,880	1,462,560

*Figures estimated.

The totals in the above table greatly exceed the amount of water in the lake according to the foregoing tables of capacities estimated from the contour maps.

The discrepancy may be accounted for in part in several ways. The contours of the map as stated elsewhere were platted partly from private surveys which have not been verified, and partly from the published maps of the former State Engineering Department. The latter showed only general and not detailed features of topography. It is highly probable that when an accurate contour survey of the lake bottom shall be made much of the discrepancy will be eliminated.

Some of the gage readings were affected by backwater from the lake, and that influence might have been operating for a longer time than allowed for in the estimates.

Also, in the table of stream flow no allowance is made for evaporation, which would amount to a large factor in the final estimates.

Furthermore, outside of the flooded area of the lake bottom, particularly at the south and east of the lake, was an additional flooded area which had intercepted a portion of the metered water before it could reach the lake. The area thus covered amounted to about 148 square miles and although most of the water temporarily impounded by it reached the lake, in any attempt to account for losses, that flooded area as well as the lake's surface proper must be regarded as evaporation areas.

Seepage into the soils beneath the water would also absorb a considerable portion, but there is no known way to arrive at the quantity it represents, but an approximation may be obtained of the probable evaporation losses.

In the following determinations the evaporation area of the lake at its maximum area for each given month is used both on rising and falling stage. This makes allowance for the extra evaporation from wetted surfaces after recession of the waters and for the evaporation due to the winds driving the water out on the dry ground.

Evaporation rates in the Tulare Lake region are high. Mr. Chas. H. Lee in "The Possibility of Permanent Reclamation of Tulare Lake Basin, California." Engineering News, January 10, 1907, uses evaporation factors based on the experiments of the State Engineering Department at Kingsburg. 1880–1884. Mr. Lee uses factors for Tulare Lake which are the means of evaporation from a pan floating in the river and a pan on the bank. His factors are as follows:

TABLE No. 10.

Evaporation from Tulare Lake.

Month	Evaporation in feet	Month	Evaporation in feet
November	0.175	June	0.630
December	.102	July	.766
January	.074	August	.791
February	.096	September	.578
March	.214	October	.314
April	.250		
May	.416	Total	4.404

The following table exhibits the inflow to Tulare Lake by months, the estimated losses from evaporation both in the lake proper and waters held outside and the accumulated remainder each month:

TABLE No. 11.

Inflow and Evaporation, Tulare Lake Basin, 1916, Expressed in Acre-Feet.

	January	February	March	April	May	June	July	August	September	Totals
Kern River		72,000	150,000	219,100	234,400	162,100	89,800	2,480		929,880
Tule River	38,300	34,500	53,100	4,860	3,000	270				134,030
Kaweah River	45,800	29,000	50,800	27,600	26,000	22,800	10,500			212,500
Kings River	23,100	11,400	26,800	19,300	46,700	53,800	5,050			186,150
Total monthly accessions	107,200	146,900	280,700	270,860	310,100	238,970	105,350	2,480		1,462,560
Lake area, square miles	60	75	108	143	162	171	171	168	167	
Lake area, acres	38,400	48,000	69,000	91,500	104,000	110,000	110,000	107,000	107,000	
Evaporation rate, inches	.074	.096	.214	.250	.416	.630	.766	.791	.578	
Evaporation[1]	2,800	4,600	14,800	22,900	43,300	69,300	84,200	85,500	61,800	389,200
Overflow, square miles		148	148	148	148	148	148	50	25	
Overflow, acres		95,000	95,000	95,000	95,000	95,000	95,000	32,000	16,000	
Evaporation[2]		9,100	20,300	23,800	39,600	59,800	72,800	25,300	9,200	259,900
Total evaporation[3]	2,800	13,700	35,100	46,700	82,900	129,100	157,000	110,800	71,000	649,100
Net gain or loss	+104,400	+133,200	+245,600	+224,160	+227,200	+109,870	—51,650	—108,320	—71,000	+813,460
Accumulated totals in basin acre-feet	104,400	237,600	483,200	707,360	934,960	1,044,430	992,780	884,460	813,460	
Capacity of lake to surface of water existing on last day of month, acre-feet	76,000	128,000	325,000	490,000	682,000	799,250	755,500	671,500	621,000	
Storage and seepage losses in overflow	+28,400	+81,600	+48,600	+59,160	+35,200	—7,380	—7,900	—24,320	—20,500	
Accumulations unaccounted for, acre-feet	28,400	109,600	158,200	217,360	252,560	245,180	237,280	212,960	192,460	

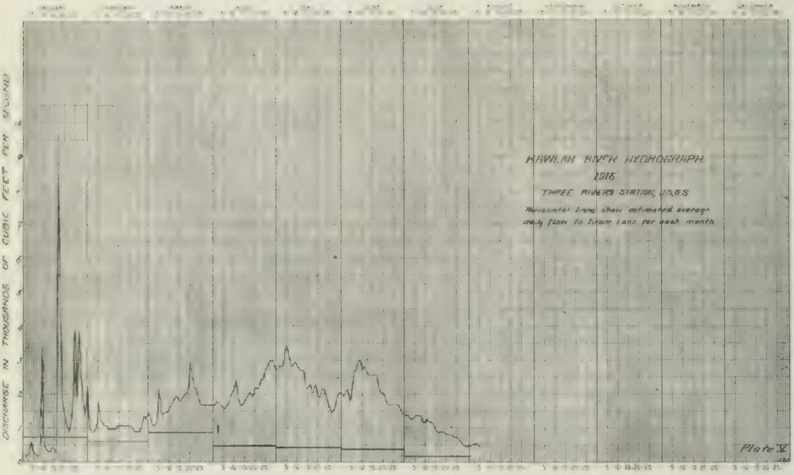
[1] Evaporation from lake surface—acre-feet.

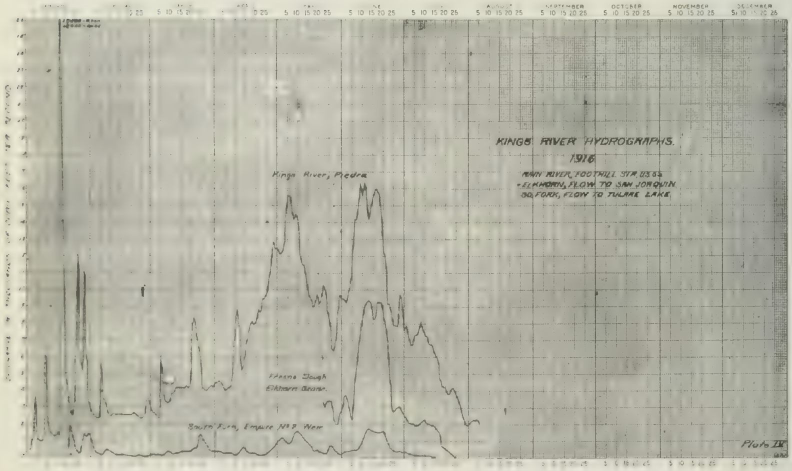
[2] Evaporation from overflow areas south and east of lake—acre-feet.

[3] Total evaporation losses from lake surface and outside waters—acre-feet.

+Indicates storage increase. —Indicates storage decrease—acre-feet.

PLATE XI.


KAWEAH RIVER HYDROGRAPH
1916
THREE RIVERS STATION, U.S.G.S
Horizontal lines show estimated average daily flow to Tulare Lake for each month
DISCHARGE IN THOUSANDS OF CUBIC FEET PER SECOND
1
2
3
4
5
6
7
8
9
10
5 10 15 20 25
Plate V


SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
AUGUST
5 10 15 20 25
KINGS RIVER HYDROGRAPHS.
1916
MAIN RIVER, FOOTHILL STA. U.S.G.S.
ELKHORN, FLOW TO SAN JOAQUIN
SO. FORK, FLOW TO TULARE LAKE
Kings River, Piedra
Fresno Slough Elkhorn Grade
South Fork, Empire No. 2 Weir
Plate IV

Owing to the lack of definite data as to contour locations south of the sand ridge on the southern margin of the lake proper, it is difficult to make any estimate on the amount of water stored in this basin. The trace of the flood line is shown on the map. In some places there is an apparent crossing of the contours. The flood line was traced out with a fair degree of accuracy. Any discrepancies shown by the contours should be assigned to improper location of the contours.

At the end of September the amount of water unaccounted for after allowing for evaporation as set forth in table above was 192,460 acre-feet. There were still some pools scattered over the flooded area to the south of the lake. The soil in this portion of the basin is somewhat sandy and would absorb considerable water.

On November 1st the ground as far south as Hart Station and for a width of several miles in the trough of the basin was wet, soft and spongy, with here and there large mudholes. Because of these conditions it is not unreasonable to assume that 192,000 acre-feet of water was taken up by the soil.

Comparison of 1906 and 1916 Floods.

From the records of discharges of the streams tributary to Tulare Lake comparative tables have been compiled for the years 1906 and 1916.

The tables are for the period January to July, inclusive, in each case:

TABLE No. 12.

Comparison Table, Floods of 1906 and 1916.

Kings River—Drainage Area, 1,740 Square Miles.

Month	Maximum daily discharge, sec.-ft.	Minimum daily discharge, sec.-ft.	Mean daily discharge, sec.-ft.	Run-off depth, inches per sq. mile	Run-off, acre-feet
1906—					
January	25,500	205	2,360	1.57	144,000
February	2,150	792	1,150	.69	63,900
March	21,000	1,220	5,240	3.47	322,000
April	7,760	2,960	4,720	3.02	281,000
May	16,800	3,930	10,700	7.09	658,000
June	26,600	8,320	17,100	11.00	1,020,000
July	22,400	8,180	16,300	10.80	1,000,000
Total for period					3,488,900
Total for year, October 1, 1905, to September 30, 1906					3,856,700
1916—					
January	*28,480	350	4,530	3.01	279,000
February	5,710	2,340	2,780	1.73	160,000
March	8,400	2,340	4,400	2.93	271,000
April	12,820	3,970	7,580	4.87	451,000
May	15,580	6,340	10,860	7.22	668,000
June	16,340	7,650	12,200	7.83	725,000
July	8,150	1,945	5,340	3.54	328,000
Total for period					2,882,000

Per cent of discharge for same period, 1916, 82.5% of 1906.

Kaweah River—Drainage Area, 520 Square Miles.

1906—					
January	5,760	75	784	1.71	48,200
February	840	274	418	.84	23,200
March	8,160	472	2,440	5.41	150,000
April	2,720	1,460	1,910	4.10	114,000
May	6,840	1,520	3,210	7.11	197,000
June	6,240	2,970	4,670	10.02	278,000
July	5,280	1,340	3,430	7.61	211,000
Total for period					1,021,000
Total for year, October 1, 1905, to September 30, 1906					1,090,000

*Crest 45,000.

TABLE No. 12—Continued.

Kaweah River—Drainage Area, 520 Square Miles—Continued.

Month	Maximum daily discharge, sec.-ft.	Minimum daily discharge, sec.-ft.	Mean daily discharge, sec.-ft.	Run-off depth, inches per sq. mile	Run-off, acre-feet
1916—					
January	9,640	130	1,576	3.56	98,800
February	1,800	895	1,085	2.26	62,500
March	2,980	1,070	1,770	3.92	108,700
April	2,980	1,580	2,130	4.57	126,500
May	3,440	1,470	2,360	5.25	145,300
June	2,980	1,365	2,170	4.66	129,100
July	1,365	490	1,010	2.17	60,100
Total for period					731,000

Per cent discharge for same periods, 1916, 71.5% of 1906.

Tule River—Drainage Area, 266 Square Miles.

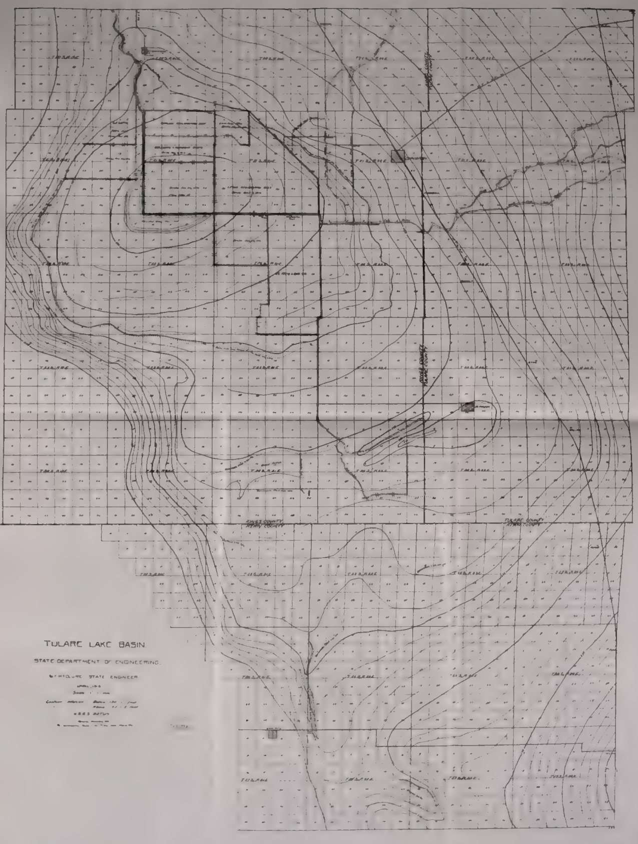
1906—					
January	3,500	98	500	2.17	30,700
February	420	132	200	.78	11,100
March	4,530	210	1,370	5.94	84,200
April	1,370	540	772	3.34	45.900
May	2,780	630	1,080	4.68	66,400
June	1,230	680	972	4.08	57,800
July	730	150	362	1.57	22,300
Total for period					318,400
Total for year, October 1, 1905, to September 30, 1906					335,000
1916—					
January	4,980	53	964	4.18	593,000
February	1,380	400	548	2.22	31,500
March	1,660	505	806	3.50	49,600
April	765	505	611	2.55	36,400
May	715	340	508	2.20	31,200
June	370	193	298	1.26	17,800
July	173	53	104	.45	6,400
Total for period					232,200

Period percentage, 1916, 73% of 1906.

Kern River—Drainage Area, 2,345 Square Miles.

1906—					
January	2,554	230	693	.34	42,600
February	785	506	626	.28	34,800
March	5,527	755	2,063	1.01	127,000
April	4,255	1,970	2,910	1.38	173,000
May	7,832	2,798	5,859	2.88	360,000
June	9,505	5,306	7,704	3.67	458,000
July	8,431	3,925	6,503	3.19	400,000
Total for period					1,595,400
Total for year, October 1, 1905, to September 30, 1906					1,840,000
1916—					
January	17,960	273	2,803	1.38	172,289
February	5,132	2,602	3,521	1.62	202,470
March	11,830	3,716	6,149	3.00	378,023
April	9,610	7,050	8,096	3.85	481,641
May	9,515	5,865	7,693	3.79	472,886
June	8,139	4,791	6,583	3.13	391,607
July	5,223	1,440	3,662	1.80	225,102
Total for period					2,324,018
Total for year, October 1, 1915, to September 30, 1916					2,463,100

Period percentage, 1916, 146% of 1906.
Year percentage, 1916, 134% of 1906.



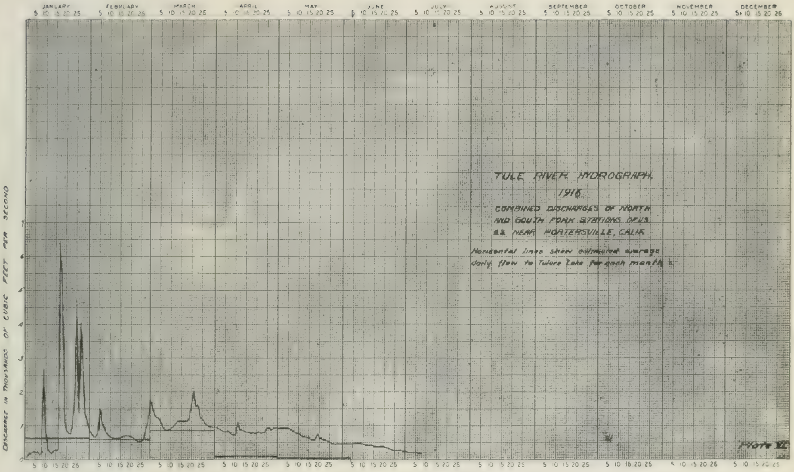
TULARE LAKE BASIN.

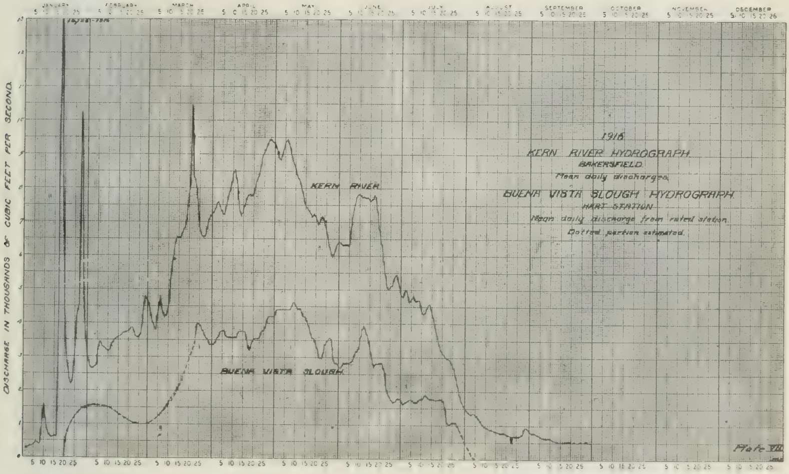
STATE DEPARTMENT OF ENGINEERING.

STATE ENGINEER

U.S.G.S. DATUM

PLATE XII.


TULE RIVER HYDROGRAPH
1916.
COMBINED DISCHARGES OF NORTH AND SOUTH FORK STATIONS OF U.S.G.S. NEAR PORTERSVILLE, CALIF.
Horizontal lines show estimated average daily flow to Tulare Lake for each month.
DISCHARGE IN THOUSANDS OF CUBIC FEET PER SECOND
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
0
1
2
3
4
5
6
7
Plate VI


1916
KERN RIVER HYDROGRAPH
BAKERSFIELD.
Mean daily discharges.
BUENA VISTA SLOUGH HYDROGRAPH
HART STATION
Mean daily discharge from rated station.
Dotted portion estimated.
KERN RIVER
BUENA VISTA SLOUGH
DISCHARGE IN THOUSANDS OF CUBIC FEET PER SECOND.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
5 10 15 20 25
0
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2
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4
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8
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10
11
12
Plate VII

From the above comparisons it is shown that Kern River was largely responsible for the extended flooding of Tulare Lake in 1916. Its discharge for the period during which it contributed water to the lake was 146 per cent of the same period of 1906, which was the largest amount recorded theretofore. The discharge for the year October 1, 1915, to September 30, 1916, was 134 per cent of the corresponding dates of 1905–6.

In comparing the total discharge of Tule River for 1905–6 with that of 1915–16 the totals for the first period are for the North Fork of Tule River only, the station on South Fork not having been established until 1911. The South Fork in 1916 contributed about 32 per cent as much as the flow of North Fork for the same period, and that ratio has been used in interpolating the figures for the entire stream flow, and the hydrograph shows the combined daily discharges of these streams. The large discharges of Tule River recorded as reaching the lake in January, February and March are due in some measure to additions received from Kakeah River through Elk Bayou, which flows into Tule River east of the gaging station.

In all the above computations of flow for 1916, excepting those for Kern River, which were furnished by the Kern County Land Company, the discharges were determined from gage heights and the latest rating tables of the United States Geological Survey. In most cases these tables were for 1915, hence the figures given are preliminary and are subject to changes, which probably will be very small, when the final records for 1916 are published.

In 1906 Kings River was responsible for the extended flooding of the lake. In 1916 the total amount contributed by this stream was less than any of the others excepting the Tule River. This is accounted for by the increased diversions and the changing of the course of the river as detailed under the description of streams entering the lake.

Acknowledgments. The State Department of Engineering acknowledges indebtedness to the following-named gentlemen for information and assistance in collecting data concerning the flood of 1916:

Mr. Max W. Enderlein, Hanford; Mr. A. D. Schindler, San Francisco; and Capt. A. L. Hunter, Corcoran.

Also the following volunteer gage readers:

Mr. R. J. Davis, Mr. W. H. H. P. Johnson, Mr. Leo van den Enden, all of Corcoran; and Mr. T. J. Hart, Lost Hills.

The department takes this opportunity to express its thanks and appreciation for their interest and substantial assistance in collecting the field data for this report.

CONSERVATION OF NATURAL RESOURCES.

In considering the subject of controlling and conserving the enormous forces under discussion one is confronted with the great costs necessary to erect works to convert them into resources. In this connection it has been suggested that certain natural resources reserved by the national government might well be devoted to this end.

It so happens that nearly all of the streams whose waters present such complex problems of flood control, reclamation, navigation and irrigation, have their sources in the canyons of the high mountains. It also happens that most of the territory drained by these streams and from which their waters come, is covered with great forests of timber, much of which is in National Forest Reserves, being withheld from sale or disposal by the government.

Some statistician has estimated that the forests in these reserves in California contain more than one hundred billion feet of standing timber of merchantable quality. It is also estimated that the value of this timber on a stumpage basis is two dollars for every thousand feet. At that rate the forests of California situated about the headwaters of her turbulent streams, and reserved from exploitation contain a revenue value which would go a long way toward assisting in the construction of reservoirs and other controlling works to direct the destructive forces of the floods to useful purposes.

In this connection it seems pertinent to suggest that now is a proper time for the State to endeavor to enlist the cooperation of the government to the end that the revenues from the National Forest Reserves be devoted to the construction of the works mentioned.

The use of large sums thus obtained which it would seem might rightfully be expended in the region from which the revenues are drawn would enable the State to expend its own funds upon projects outside the forest reserves, the development of which demand all the financial assistance the State has to offer—and more.

The consideration of the foregoing is commended to the people of the State represented in the Legislature.

DEBRIS CONTROL.

In 1893 the congress passed an act known as the "Caminetti Act," authorizing hydraulic mining on the tributaries of the Sacramento and San Joaquin rivers, under prescribed restrictions and created the California Debris Commission to enforce those regulations.

The commission, composed of three officers of the Engineer Corps of the United States Army in addition to its duties of regulating hydraulic mining was enjoined to mature and adopt plans to improve the navigability of the above-named river systems, to protect same from damage due to mining debris, and to afford relief thereto in flood time.

In pursuance of its duty first mentioned, the commission grants license to operate mines by the hydraulic process whenever the operator has provided means for preventing the debris from the mine reaching the navigable streams. Such prevention is usually accomplished by dams creating reservoirs in which the debris can be impounded. Such measures are frequently so expensive that not many mines are being operated under the licenses issued. Since the commission was created and prior to July 31, 1916, it had received 897 petitions for authority to operate, but not all were granted. During 1915 only five applications were made and one license to operate granted.

In complying with the duty imposed upon the commission to devise means of preventing injury to the navigable streams from debris the commission formulated plans for the control of debris in the Yuba River. Congress in 1896 and 1902 appropriated $400,000, and the state a like amount with which the commission has constructed training and controlling works on the Yuba River above Marysville. These works, which have been fully described in previous reports, are showing their utility by a marked decrease in the quantity of debris being carried by that stream into the Feather River.

The problems of navigation and flood control, the solution of which was confined to the Debris Commission, was made the subject of extensive research and study and resulted in 1910 in the presentation of a most comprehensive plan for the accomplishment not only of improved navigable conditions but the complete control of floods and permanent reclamation of the inundated lands of the Sacramento Valley, under the joint effort of the government and the state.

The plan presented is now being executed by the State Reclamation Board and Department of Engineering in cooperation with the United States as more fully discussed herein under the title of "Sacramento River Problems."

The details of the operations conducted by the Debris Commission for the year ending June 30, 1915, appear in the report of the commission herein quoted in full.

EXTRACT FROM THE ANNUAL REPORT OF THE CHIEF OF ENGINEERS TO THE SECRETARY OF WAR.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, September 28, 1915.

* * * * * * *

CALIFORNIA DEBRIS COMMISSION.

Jurisdiction and duties extend over the drainage area of the Sacramento and San Joaquin rivers, comprising the great central valley of California and extending from the crest of the Sierra Nevada Mountains on the east to that of the Coast Range on the west; from Mount Shasta on the north to the Tehachapi on the south. These rivers empty into the head of Suisun Bay, ultimately discharging through the connecting bays and straits to the Pacific Ocean through the Golden Gate.

PRELIMINARY GENERAL STATEMENT.

Act of Congress approved March 1, 1893 (27 Stat. L., p. 507), created the California Debris Commission, to consist of three officers of the Corps of Engineers, and prescribes the duties of the commission.

During the fiscal year the commission consisted of Lieutenant Colonel Thomas H. Rees, Corps of Engineers (senior member); Major R. R. Raymond, Corps of Engineers; Major S. A. Cheney, Corps of Engineers (secretary), from July 1 to August 7, 1914, and from that date Major L. H. Rand, Corps of Engineers (secretary), the secretary having immediate supervision of the work.

The duties imposed and powers conferred upon the commission are:

> *First.* To regulate hydraulic mining in such a way as to permit its resumption and continuance as far as the same might be practicable without so unduly interfering with river conditions as to cause injury to other interests in the state.
>
> *Second.* To study and report upon general hydraulic and hydraulic mining conditions and matters affecting or affected by them, for the purpose of improving the navigability, deepening the channels, and protecting the banks of the rivers and affording relief from flood damages. While the commission was to "adopt" plans as a result of its study, no provision of means for permitting it directly to carry them out was made. Congress has from time to time adopted certain of the plans formulated by the commission, made appropriations therefor, and directed their execution, under the direction of the Secretary of War and the supervision of the Chief of Engineers. The present duties of the commission, therefore, fall under two heads:
>
> > (*a*) Those directly imposed upon it by congress under two subheads above given (pp. 1600–1603).
> >
> > (*b*) Those assigned to it by the War Department as a logical consequence of its other duties. These latter at present consist of: 1. Treatment of the Yuba River debris situation (p. 1603); 2. Alleviation of debris conditions in the Sacramento and Feather rivers, California (p. 1606).

These four are separately covered under the general arrangement of previous portions of this report.

For the Commission's Own Report Giving Additional Details of Its Work, See Pages 3455 to 3465.

1. Regulation of Hydraulic Mining.

Location. While this is as given above, in practice the operations are largely limited to the territory on the western watershed of the Sierra Nevada Mountains, between Mount Lassen on the north and the Yosemite Valley on the south.

Original Condition. Following the discovery of gold in California and the development of the hydraulic method of working the placer deposits in the mountains and foothills, vast quantities of the material washed out of the banks, denominated "debris," passed down into the lower ground, naturally depositing in the beds of the watercourses and rivers, and at high-water times being carried over the banks of the streams to the adjacent country. The results of this filling of navigable channels, destroying of the fertility of lands, breaking of levees, etc., was that mining by the hydraulic process has been effectively stopped by judicial injunction.

Previous Project. None.

Present Project. As adopted in the organic act above given, contemplated the resumption and continuance of hydraulic mining under the regulation of the commission. This is effected by the issuance, on application and after prescribed information has been furnished and the matter received full consideration, of permits to operate by the hydraulic process those mines for which satisfactory debris-restraining basins, formed by construction of suitable dams where necessary, have been provided.

Operations and Results Prior to the Fiscal Year. The commission had received 899 applications for permits to mine, and granted such of them as it was suitable to do. Hydraulic mining on a very limited scale has been restored without the addition in any considerable amount of new debris to that previously deposited in the rivers, creeks and canyons of mining regions. The navigable streams below have hence been able to progressively work off their overload of debris. Navigation in the upper reaches of the rivers and flood conditions have in consequence been improved. Expenditures for these purposes have not been kept separate from those for studies and reports given below.

Operations and Results During the Fiscal Year. During the year five applications for permits to mine were received, and one was granted. Four permits were revoked because of failure to comply with the rules adopted by the commission. Numerous inspections were made of the hydraulic mining region and of mines and their works for restraining debris. The result has been a reasonable maintenance of the favorable conditions existing. Expenditures have not been kept separate from those for studies and reports given below.

Condition at the End of the Fiscal Year. Ten hydraulic mines are operating under licenses and three others have been authorized to construct impounding works. The improved conditions of navigability which have resulted partly from the general cessation of hydraulic mining have not been impaired by such mining as has been done under permits.

Local Cooperation. An antidebris association, formed and supported by local interests that would be injured by the restoration or increase of former conditions, works along lines of prevention by injunction and criminal prosecution under state laws, as do various other local officials and volunteers. They report from time to time indications of violations of the laws, and in turn seek and are furnished information from this office on the subject.

Effect of Improvement. Can be expressed only in the general terms given above.

Proposed Operations. Consideration will be given applications for permits for hydraulic mining and regulation of those operating under permits, with necessary inspections, preparations and approval of plans, etc., as during preceding years.

Commercial Statistics. The commercial statistics for Sacramento, Feather, Mokelumne and San Joaquin rivers, as separately reported upon elsewhere, are in a degree dependent upon this work. No others relating thereto are or can be at reasonable expense compiled.

2. Studies and Reports Upon General Hydraulic and Hydraulic Mining Conditions and Matter Affecting or Affected by Them.

Present Project. This consists of progressively examining, surveying, studying conditions, maturing plans and reporting upon same, for improving those conditions upon the Sacramento and San Joaquin rivers and their several tributaries affected by hydraulic mining operations.

Operations and Results Prior to the Fiscal Year. Surveys had been made of those portions of the Feather, Yuba, Bear and American rivers in which there are great deposits of mining debris. Incidental to studies relative to the relief from injuries to navigability and from floods, surveys have also been made of portions of the Sacramento, Mokelumne and San Joaquin rivers and of the interconnecting sloughs in the delta of these three streams. Plans have been prepared and adopted for restraining the debris movement in Yuba River (see No. 3 hereunder) and for alleviating debris conditions from the Sacramento and Feather rivers (see No. 4 hereunder). A report upon a comprehensive flood-control scheme for the Sacramento River and tributaries has been submitted. (See H. Document No. 81, 62d Congress, First Session.)

Expenditures from appropriations for "Expenses of California Debris Commission," including those under No. 1 and No. 2, which can not be separated, aggregate (to June 30, 1914) $234,089.46*

Operations and Results During the Fiscal Year. Survey of the lower Mokelumne River and of the several sloughs connecting it to the Sacramento and San Joaquin rivers has been continued. Examination and surveys of critical points on Sacramento and San Joaquin rivers, for use in maturing plans for improving navigability and for relief from floods, have been made. There were expended from appropriations for "Expenses for California Debris Commission," including those under both No. 1 and No. 2, $14,947.42.

Local Cooperation. No cooperative conditions were imposed by congressional act. The state reclamation board act adopted, with such modifications as might be found necessary, the plan reported upon by the California Debris Commission for flood control on the Sacramento River. The commission cooperates with the state reclamation board to the extent of reviewing all of those plans submitted to the board, which are referred to the commission.

Effect of Improvement. Is as given in the general terms expressed above.

Proposed Operations. Further studies, examinations and surveys will be made along same lines as during previous years.

Commercial Statistics. The commercial statistics for Sacramento, Feather, Mokelumne and San Joaquin rivers, as separately reported upon elsewhere, are in a degree dependent upon this work. No others relating thereto are or can be at reasonable expense compiled.

FINANCIAL SUMMARY.

Amount expended on all projects to June 30, 1915:	
New work	[1]$249,036 88
Maintenance	--------

Amount expended during fiscal years ending June 30:	1913	1914	1915
New work	$9,200 95	[2]$14,193 93	$14,947 42
Maintenance	-------	--------	--------

APPROPRIATIONS.

(For last five fiscal years only.)

March 4, 1911	$15,000 00
August 24, 1912	15,000 00
June 23, 1913	15,000 00
August 1, 1914	15,000 00
March 3, 1915	15,000 00
July 1, 1914, balance unexpended	[3]$9,721 20

---

*Approximate; records of office prior to 1906 destroyed by fire.

[1] Approximate only; records of district office prior to 1906 destroyed by fire.

[2] A reduction of 80 cents from figures reported in 1914 report, due to refund from overpayment made in that fiscal year.

[3] This increased 80 cents due to refund of overpayment.

Amount appropriated by sundry civil act approved August 1, 1914		$15,000 00
Amount appropriated by sundry civil act approved March 3, 1915		15,000 00
		$39,721 20
Deduction on account of reversion to United States Treasury:		
June 30, 1914	$3,187 06	
June 30, 1915	5,728 07	8,915 13
		$30,806 07
June 30, 1915, amount expended during fiscal year for works of improvement		[4]$14,947 42
July 1, 1915, balance unexpended		$15,858 65
July 1, 1915, outstanding liabilities		274 88
July 1, 1915, balance available		$15,583 77
Amount (estimated) required for expenses of California Debris Commission during fiscal year ending June 30, 1917		$15,000 00

3. Treatment of the Yuba River Debris Situation—Restraining Barriers.

Location. The works of this project are located on the Yuba River, California, between Marysville and the place where the Yuba River emerges from the foothills near Hammonton, some ten miles easterly from Marysville, and about nine miles below the Narrows.

Original Condition. Before this improvement was begun the mining debris that was being carried down by this stream from the old hydraulic mine workings in the Sierra Nevadas was allowed to pass on into the navigable channels of the Feather and Sacramento rivers. This had resulted in the navigable channels of these streams being seriously impaired, and navigation on them was threatened with cessation.

Previous Projects. None.

Present Project. The present project, in a rather indefinite form, was adopted by the river and harbor act of June 11, 1896, and in its more determinate form, was adopted by the river and harbor act of June 13, 1902, in accordance with report (H. Document No. 431, 56th Congress, First Session). This report contemplated, primarily, the storage of mining debris within the bed of the Yuba River by a system of works designed to separate the coarse material from the fine; and, secondarily, the restriction of the low water channel below these works to narrow, well-defined limits, in order to preserve in place the extensive mining debris deposits already in the river. The objects sought were to be accomplished by (1) the construction of four restraining barriers in the bed of the river to hold back the coarser materials, and a settling basin nearby to catch the finer material carried in suspension, and (2) by the construction below the barriers of training walls to confine the river to well-defined lines. The barriers were to be built by steps, successive steps to be built when the storage basin, formed by the preceding step, had filled with debris. The object of storing this debris in the Yuba River—a nonnavigable stream—was to keep it from passing on into the navigable channels of the Sacramento and Feather rivers, to the detriment of the navigation therein. The estimated cost of the project was $800,000, one-half of which was to be borne by the state of California.

By the river and harbor act of June 25, 1910, the settling basin was eliminated from the project and the sale of the land acquired for its purpose authorized.

Operations and Results Prior to the Fiscal Year. The barriers to be built were numbered, going downstream, respectively, 2, 1, 3, and 4, being serially numbered in the order that it was at first planned they should be built. The first step of barrier No. 2 was built and some material was placed in barrier No. 1, when both were carried away by floods of November, 1903. Barrier No. 2 was then abandoned. The plans were revised to give a more stable design, and two steps of barrier No. 1, with side wall to separate the spillway from the main dam, and part of spillway were constructed, but this barrier was destroyed by flood in March, 1907. Then barrier No. 1 was abandoned. By this time the recently developed gold-dredging operation procedure had advanced to such a stage that it was practicable in this locality to take advantage of the work the dredges were doing. The dredges in working over ground separate the fine material from the coarse rocks. This, of course, increases the volume and raises the height of the worked-over ground from 15 to 20 feet above its original level. The finer material is deposited below the original ground surface, while cobbles and coarse gravel are left above the natural surface to withstand the action of the water. In this way a training wall or levee of cobbles and coarse gravel, which obviates the need of the two lower barriers proposed, was built. The cut through Daguerre Point (a low promontory extending from the north bank well out into the stream, a cut through which was proposed in conjunction with the lowest restraining barrier) was made and the inlet wall, or spillway, in the same constructed. This cut was necessary to obtain a good foundation for the spillway for the proposed lower barrier. Cobble training walls on each side of the river below this cut were built for some 12,000 feet. The entrance gates to the settling basin were constructed, most of its inclosing levees were built, and the outlet works were practically completed when this part of the project was found no longer necessary and was abandoned under authority of the river and harbor act of June 25, 1910. The land acquired for the settling basin was then sold, together with the intake and outlet works.

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[4] Includes $571.16 available only for outstanding liabilities of previous fiscal year; none such known.

The river channel from the lower end of the training walls to Marysville had been cleared of brush and trees at different times. This work was done to enable the high water to get away from the vicinity of the works at a fast rate and to aid the river to cut a deep permanent channel along definite lines.

The result of this work has been that many million cubic yards of mining debris have been held within the bed of the Yuba River that would otherwise have passed on into the navigable channels of the Feather and Sacramento rivers.

The expenditure of this project prior to the fiscal year was $348,328.85 of United States funds, together with an expenditure of $347,678.88 by the state of California. All of this expenditure was for original improvement.

Operations and Results During the Fiscal Year. During the fiscal year the inlet wall at Daguerre Point cut was raised about 18 inches and covered with a wooden deck, the toe of the inlet wall was protected, and the brush and trees were cut away from the river channel just above the inlet wall. Below the training walls an embankment was thrown up across the head of an old channel and two smaller channels leading into it were also closed. The brush and trees were cut from the banks and channel of the three miles of the river immediately above Marysville, and some additions were made to the training wall system below Daguerre Point. The total expenditure of the year was $19,815.48, $9,983.51 of which were expended by the United States and $9,831.97 by the state of California. All the expenditure was for original improvement.

It is estimated that 3,880,000 cubic yards storage capacity was added to the storage basin above by the raising of the inlet wall, and it is thought the wooden deck will better withstand the wear of gravel passing over it than did the concrete surface heretofore afforded. The cutting away and burning of the brush and trees immediately above the inlet wall serves to distribute the attack of the water-borne gravel upon that wall. The embankment across the old channel has cut off what threatened to be a change in the main channel of the river and has maintained in place the debris already stored in that old channel. The clearing away of the brush and trees over the portion of the river just above Marysville is aiding the river toward making its permanent channel.

Condition at the End of Fiscal Year. It is estimated that 91.5 per cent of the project was completed at the end of the fiscal year. The total expenditure up to that time was $715,823.21, all of which was for original improvement. Of the total expenditure $358,312.36 was from United States funds, and $357,510.85 was expended by the state of California.

Local Cooperation. The act approved June 13, 1902, appropriating the final $250,000 of the $400,000 the United States has appropriated for the project, provided that the state of California should also appropriate $400,000 for the project, to stand half the cost. The state of California has met the conditions imposed by congress. Two gold-dredging companies—the Yuba Consolidated Gold Fields and the Marysville Gold Dredging Company—have built training walls on the south side of the river, below Daguerre Point cut. This has been done in connection with their dredging operations. The Yuba Consolidated Gold Fields has also built a training wall, or rock levee, which has taken the place of the two lower barriers proposed in the original project. It is estimated that it would have cost the United States $450,000 to have built the 22,500 linear feet of training walls.

Effect of Improvement. The retaining of this debris in the bed of the Yuba River has facilitated continuous navigation on the Sacramento River, and during the higher stage of the water, on the Feather River. Conditions on both these rivers in regard to obstructions from debris are steadily improving.

Proposed Operations. As it is thought that the funds available for this improvement are sufficient to cover for several years the cost of the work that will be done, no appropriation is asked for this project.

No especial deterioration, destruction, or decay has taken place to the works of this improvement during the past year.

Commercial Statistics. See commercial statistics for Sacramento River.

FINANCIAL SUMMARY.

Amount expended on all projects to June 30, 1915:

New work	[1]$358,312 36
Maintenance	----------

Amount expended during fiscal years ending June 30:

	1913.	1914.	1915.
New work	$2,014 86	$315 04	$9,983 51
Maintenance	-------	-------	--------

APPROPRIATIONS.

(For last five fiscal years only.)
None.

July 1, 1914, balance unexpended	$79,950 63
June 30, 1915, amount expended during fiscal year for works of improvement	9,983 51
July 1, 1915, balance unexpended	[2]$69,967 12

4. Alleviation of Debris Conditions in the Sacramento and Feather Rivers, California.

Location. The work being done is from the mouth of the Sacramento River, California, at Collinsville, to Rio Vista, 14 miles above.

Original Condition. The valley of the Sacramento and Feather rivers is generally alluvial formation, having the characteristic elevation of river banks, with depressed basins on each side. Debris resulting from hydraulic mining operations and natural erosion had obstructed the channels of these rivers, had by filling materially raised their beds, and had reduced their capacity. The streams have broken through their banks and overflowed large areas during high floods, increasing the number and extent of bars and shoals in the channels themselves. The presence of these large deposits of debris in the river channels and its variable movement downstream had impaired their navigability.

Previous Projects. None.

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[1] In addition $357,510.85 has been expended by state of California.
[2] In addition $42,000 is left of the amount appropriated by the state of California.

Present Project. The construction and 56 months' operation of two hydraulic dredges for removal of deposits from the river system to prevent their impeding navigation. It is purely of a qualitative nature, no quantitative results in depth, width, or locality determination having been established. It is based on matter contained (in accordance with the organic act for the California Debris Commission) in the annual report of that commission for 1907, as printed on pages 2253–2269, annual report for that year. The approved estimate of cost was $800,000, half of which was to be provided by local interests according to recommendation of the commission adopted in the river and harbor act of June 25, 1910. This estimate was exclusive of necessary rights of way for spoil bank, levee, etc., which also were to be supplied by local interests. During the time elapsed between the proposal and the adoption of the project, local conditions had so changed that it has been necessary to increase the original estimate for completion to $1,660,000. Daily tidal fluctuation at the mouth is about six feet and varies upstream according to distance and stage. At Sacramento City, 60 miles above the mouth, maximum daily tide of slightly over one foot at extreme low water has been observed. Annual flow variations of level at the city of Sacramento approximate 17 feet, with occasional variations of 20 feet, and extreme cases up to 26 feet variation within a few years.

Operations and Results Prior to the Fiscal Year. Two 20-inch pipe-line hydraulic dredges, together with the necessary auxiliary plant, were constructed at a cost of $444,156.47. These dredges were placed in operation in July and August, 1913, and prior to the fiscal year had excavated 3,373,045 cubic yards of material from the channel of the Sacramento River between Collinsville and Rio Vista.

Of the material excavated 1,550,000 cubic yards was placed in banks which could be used as parts of levees in Sherman Island, and 1,823,000 cubic yards was wasted. The total amount (none for maintenance) expended prior to July 1, 1914, was $639,554.38.[1]

Operations and Results During the Fiscal Year. The dredging plant has been operated and maintained throughout the year, and has excavated 6,379,529 cubic yards of deposit, which has been placed on Sherman Island at Baker's Point, or wasted elsewhere. A retaining embankment for further spoil deposit for a distance of 18,842 feet upstream from Collinsville, containing 301,472 cubic yards, was constructed by hired bucket dredge. The total amount expended on the work during the fiscal year ending June 30, 1915, was $226,288.80. Of this amount $216,268.58 was for the hydraulic excavation and $10,020.22 for construction of the retaining embankment. This has resulted in lowering the river bed and the enlargement of the channel below Rio Vista for 30,000 feet, including the removal of a portion of the old levee on the north side of the channel.

Condition at End of Fiscal Year. One dredge has now been in operation for 20.4 months, the other for 22.4 months, which is 38 per cent of the 112 months' single-dredge operation contemplated. Up to June 30, 1915, there have been excavated from the Sacramento River 9,752,574 cubic yards of material. Below Rio Vista the channel has been enlarged by a width of 275 feet and a depth of 27 feet for a distance of 12,400 feet, and the old levee (13,400 linear feet), located on the north side of the channel, has been removed. Above Collinsville the channel has been enlarged by an average width of 100 feet and a depth of 27 feet for a distance of 4,800 feet; the west side of the channel has been excavated to a depth of 27 feet and width of 250 feet for a distance of 14,000 feet, and 2,598,735 cubic yards of material have been removed from the east side of the channel and placed on Sherman Island. It is not practicable to claim any definite specific results as solely consequent to this operation, but the general improvement noted in those matters which it was meant to effect is believed to follow at least, in part, therefrom. The total expenditure on the project up to June 30, 1915, has been $865,843.18, none of which is for maintenance.

Local Cooperation. Requirements were set out above under "Present Project." The necessary approval of compliance with these conditions as a condition precedent to starting field operations was given by the Secretary of War in 1913. The $400,000 was deposited for federal expenditure. It is understood local interests subscribed $260,000, aided by the state and the city of Sacramento, in procuring the land and easements for spoil banks, etc., which they have transferred to the United States. The state has further deposited $200,000 to match equivalent funds made available by the federal government.

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[1] Figures in report for fiscal year 1914 reduced $7.58, owing to refund of overpayment included therein.

Effect of Improvement. Not definite; see above under results.

Proposed Operations. Are to continue the dredging as outlined above under the project exposition. The estimated cost of these operations is as follows: For the operation and maintenance of two hydraulic pipe-line dredges in accordance with the provisions of the act of congress approved June 25, 1910, for a period of 34.6 months from June 30, 1915, at $23,000 per month, $795,800. The amount available on June 30, 1915, from all sources is (in round numbers) $335,000, leaving $461,000 to be provided at this end, of which it is expected one-half will be provided by the state ot California or other local agency.

Commercial Statistics. See commercial statistics for Sacramento River.

FINANCIAL SUMMARY.

United States Funds.

Amount expended on all projects to June 30, 1915:

New work	$460,000
Maintenance	------

Amount expended during fiscal year ending June 30:

	1913.	1914.	1915.
New work	$268,276 18	$1 67	$60,000
Maintenance	---------	-----	------

APPROPRIATIONS.

(For last five fiscal years only.)

October 2, 1914	$60,000 00
March 4, 1915	140,000 00

Amount allotted from river and harbor act approved October 2, 1914	$60,000 00
Amount allotted from river and harbor act approved March 4, 1915	140,000 00
	$200,000 00
June 30, 1915, amount expended during fiscal year, for works of improvement	$60,000 00
	$140,000 00
Amount (estimated) required to be appropriated for completion of existing project	[1]$230,500 00
Amount that can be profitably expended in fiscal year ending June 30, 1917, for works of improvement	[1]75,000 00

FUNDS CONTRIBUTED BY STATE OF CALIFORNIA.

Amount expended on all projects to June 30, 1915:

New work	[2]$405,843 18
Maintenance	---------

Amount expended during fiscal year ending June 30:

	1913.	1914.	1915.
New work	$17,490 93	[2]$222,063 45	$166,288 80
Maintenance	--------	-----------	---------

APPROPRIATIONS.

(For last five fiscal years only.)

July 1, 1911	$400,000 00
May 20, 1915	60,000 00
July 24, 1915	140,000 00

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[1] Exclusive of the balance unexpended July 1, 1915.

[2] Amount reported last year reduced $7.58, due to refund of overpayment made in that year.

July 1, 1914, balance unexpended		[3]$161,203 26
May 20 and July 24, 1915, amount contributed by state of California		200,000 00
		$361.203 26
June 30, 1915, amount expended during fiscal year, for works of improvement		166.288 80
July 1, 1915, balance unexpended		$194,914 46
July 1, 1915, outstanding liabilities	$20,081 65	
July 1, 1915, amount covered by uncompleted contracts	4,695 00	
		24.776 65
July 1, 1915, balance available		$170,137 81
Amount (estimated) required to be appropriated by state of California for completion of existing project		[4]$230,500 00
Amount that can be profitably expended in fiscal year ending June 30, 1917, for works of improvement		[4]75,000 00

CONSOLIDATED.

Amount expended on all projects to June 30, 1915:			
New work			[5]$865,843 18
Maintenance			----------
Amount expended during fiscal year ending June 30:			
New work	$285,767 11	[5]$222,065 12	$226,288 80
Maintenance	---------	----------	----------

APPROPRIATIONS.

(For the last five fiscal years only.)

July 1, 1911	$400,000 00
October 2, 1914	60,000 00
March 4, 1915	140.000 00
May 20, 1915	60,000 00
July 24, 1915	140,000 00

July 1, 1914, balance unexpended		$161.203 26
Amount allotted from river and harbor act approved October 2, 1914		60,000 00
Amount allotted from river and harbor act approved March 4, 1915		140.000 00
May 20 and July 24, 1915, amount contributed by State of California		200,000 00
		$561,203 26
June 30, 1915, amount expended during fiscal year, for works of improvement		226,288 80
July 1, 1915, balance unexpended		$334.914 46
July 1, 1915, outstanding liabilities	$20,081 65	
July 1, 1915, amount covered by uncompleted contract	4,695 00	
		24,776 65
July 1, 1915, balance available		$310,137 81
Amount (estimated) required to be appropriated for completion of existing project		[6]$461,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1917, for works of improvement		[6]150,000 00

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[3] This amount is increased 37 cents over that report in 1914, due to refundment of overpayment of that amount.

[4] Exclusive of the balance unexpended July 1, 1915.

[5] Amount reported last year reduced $7.58 due to refund of overpayment made in that year.

[6] Exclusive of the balance unexpended July 1, 1915.

REPORT OF CALIFORNIA DEBRIS COMMISSION.

IMPROVEMENTS.

Page
1. Regulation of hydraulic mining ---- 3455
2. Studies and reports upon general hydraulic mining conditions and matter affecting or affected by them ---- 3457
3. Treatment of the Yuba River debris situation—restraining barriers ---- 3459
4. Alleviation of debris conditions in the Sacramento and Feather rivers, California ---- 3461

For description of improvements in this district, see pages 1599 to 1610.

1. Regulation of Hydraulic Mining.

During the fiscal year five applications for permits to mine by hydraulic process were received. One permit was granted. Four permits were revoked because of failure to comply with the rules adopted by the commission.

SYNOPSIS OF APPLICATIONS TO MINE BY THE HYDRAULIC PROCESS AND ACTION TAKEN THEREON.

Number	Name of mine	County	Name of owner	Mine drains into tributary of	Nature of restraining works	Approximate amount of gravel to be worked	Date of application	Action on application
892	St. Louis	Yuba	F. J. Donohue, J. H. Thomas.	Sacramento River	Concrete dam proposed	----------	Sept. 13, 1912	Authorized to build dam Oct. 23, 1912, construction work not yet begun.
899	Bessie Bench	Shasta	J. G. Andree	Sacramento River	Long crib dam constructed	32,000	April 30, 1914	Authorized to mine March 19, 1915.
900	Brandy City	Sierra	E. L. Goldstein Co.	Sacramento River	Concrete dam proposed	10,000,000	Mar. 22, 1915	Authorized to build dam May 5, 1915.
901	Jaynes Mine	Yuba	R. V. Buckley	Sacramento River	Earth dyke proposed	20,000	Aug. 20, 1914	Authorized to construct dyke Sept. 22, 1914.
902	President Harrison	Plumas	C. A. Macomber	Sacramento River	Reinforced concrete dam proposed.	12,000	Aug. 24, 1914	Action postponed.
903	Waloupa	Nevada	George Wight	Sacramento River	Hydraulic fill proposed	2,000,000	Nov. 7, 1914	Disapproved Dec. 1, 1914.
904	Esperance	Nevada	Phillip Hayes & Co.	Sacramento River	Log dam proposed	39,000	Dec. 7, 1914	Disapproved.

LICENSES REVOKED.

No.	Name of mine	County	Name of owner	Mine drains into tributary of	License revoked
777	Quarry	Tuolumne	Pacific Lime and Plaster Co.	San Joaquin River	May 5, 1915
856	Cleveland	Sierra	Neocene Placer Mining Co.	Sacramento River	Sept. 17, 1914
883	Nigger Gulch	Tuolumne	E. C. Grant	San Joaquin River	Sept. 21, 1914
891	Bear River Hill and Queen City.	Placer	A. W. Nicholls	Sacramento River	Oct. 15, 1914

Ten hydraulic mines are operating under licenses and three others have been authorized to construct impounding works.

Synopsis of Licenses to Mine by the Hydraulic Process in Force June 30, 1915.

No.	Name of mine	Name of owner	Mine drains into tributary of	Kind of dam	Date of license
127	Depot Hill	F. J. Joubert	Sacramento	Concrete	Jan. 5, 1909
768	Brandy City	A. Steinberger	Sacramento	Hydraulic fill	Nov. 30, 1908
837	Sky High	G. W. Bradon et al.	Sacramento	Log and brush	Dec. 29, 1908
867	Hydraulic King	Gold Mountain Hydraulic and Dredging Co.	Sacramento	Concrete	Sept. 29, 1913
868	Red Cloud	Alvah G. Eckel	San Joaquin	Hydraulic fill	Oct. 6, 1910
884	Goggens	Sierra Nevada Development Co.	Sacramento	Log	Nov. 21, 1911
885	Cherokee	D. L. Vintin	Sacramento	Concrete and earth	Oct. 21, 1911
897	Birdseye Creek	E. T. Banning et al.	Sacramento	Earth	May 26, 1913
898	Omega	South Yuba Mining Development Co.	Sacramento	Cobbles in wire baskets backed by earth fill.	Mar. 13, 1914
899	Bessie Bench	J. G. Andree	Sacramento	Log	June 21, 1915

2. Studies and Reports Upon General Hydraulic and Hydraulic Mining Conditions and Matters Affecting or Affected by Them.

For the purpose of maturing plans for improving navigability of the rivers of the Sacramento and San Joaquin River systems, deepening their channels and protecting their banks with a view to making them effective as against encroachment of and damage from debris resulting from mining operations, natural erosion, or other causes, as called for in the act creating the California Debris Commission, there were made during the fiscal year surveys of Mokelumne River, including both the north and south fork from New Hope Landing to its mouth, Snodgrass Slough from the Mokelumne River to its head in Sacramento Basin, and Georgiana Slough, which connects the Sacramento River at Walnut Grove with the Mokelumne River, near the mouth of the latter, aggregating 49½ miles in length, and some assistance was rendered the third San Francisco district in a survey of the San Joaquin River proceeding under it, the data for which will be available for commission purposes.

Under state laws all plans for new reclamation of lands from floods and for constructing new or altering old levees within the areas subject to floods of the Sacramento and San Joaquin rivers and their tributaries are submitted to and passed upon by a state reclamation board. All applications and plans for these works are referred by that board to this office, which has in each case indicated to the board whether or not the proposed plans are likely to interfere with carrying out the plans matured and adopted by the commission under the act approved March 1, 1893 (H. Document, No. 81, 62d Congress, First Session).

The expenditures during the fiscal year ending June 30, 1915, for regulating hydraulic mining and making examination and surveys for improvement of navigation, control and disposition of mine debris and control of flood waters, were as follows:

Regulating hydraulic mining, examinations, surveys, plans for control disposition of mine debris and control of flood waters	$10,592 84
Survey of portions of Mokelumne River, Snodgrass and Georgiana sloughs	4,119 67

APPROPRIATIONS.

Act—	
Oct. 1, 1888	[1]$10,000 00
Mar. 1, 1893 (California Debris Commission)	15,000 00
June 11, 1896 (sundry civil)	15,000 00
June 4, 1897 (sundry civil)	15,000 00
June 19, 1897 (urgent deficiency) (claims)	[2]111 70
July 1, 1898 (sundry civil)	15,000 00
June 7, 1898 (urgent deficiency) (claims)	[2]40
Mar. 3, 1899 (sundry civil)	15,000 00
June 6, 1900 (sundry civil)	15,000 00
Mar. 3, 1901 (urgent deficiency) (claims)	[2]4 37
Mar. 3, 1901 (sundry civil)	15,000 00
Feb. 14, 1902 (urgent deficiency) (claims)	[2]1 52
June 28, 1902 (sundry civil)	15,000 00
Mar. 3, 1903 (sundry civil)	15,000 00
April 28, 1904 (sundry civil)	15,000 00
Mar. 3, 1905 (sundry civil)	15,000 00
June 30, 1906 (urgent deficiency)	[3]5,000 00
June 30, 1906 (sundry civil)	15,000 00
Mar. 4, 1907 (sundry civil)	15,000 00
May 27, 1908 (sundry civil)	15,000 00
Mar. 4, 1909 (sundry civil)	15,000 00
Feb. 25, 1910 (urgent deficiency) (claims)	[2]6 10
June 25, 1910 (sundry civil)	15,000 00
Mar. 4, 1911 (sundry civil)	15,000 00
Aug. 24, 1912 (sundry civil)	15,000 00
June 23, 1913 (sundry civil)	15,000 00
Aug. 1, 1914 (sundry civil)	15,000 00
Mar. 3, 1915 (sundry civil)	15,000 00
Total	[4]$330,124 09
Less reversions to treasury subsequent to 1906	14,081 63
Balance	[4]$316,042 46

CONTRACTS IN FORCE.

Survey Operations on Mokelumne River, California.
Lease of Gasoline Launch.

Name of contractor: O. F. Peterson.
Date of contract: August 1, 1914.
Date of approval: Lease; approval not required.
Date fixed for commencement: August 1, 1914.
Actual date of commencement: August 1, 1914.
Date fixed for completion: October 31, 1914.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $600.
Price per unit: $200 per month.

Name of contractor: O. F. Peterson.
Date of contract: December 1, 1914.
Date of approval: Lease; approval not required.

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[1] For preliminary examination.

[2] Not disbursed through War Department.

[3] To restore property and records destroyed by fire in April, 1906.

[4] Owing to the destruction in the fire of 1906 of the records of the San Francisco office, where the only accessible record of reversions to treasury, etc., was kept, it is not practicable to reconcile this amount with the amounts indicated in the financial summary, since the reports submitted prior to that time did not so separate these items as to permit their correct entry under present form of obtaining balance.

Date fixed for commencement: December 1, 1914.
Actual date of commencement: December 1, 1914.
Date fixed for completion: February 15, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $500.
Price per unit: $200 per month.

Commercial Statistics.

See commercial statistics for Sacramento, San Joaquin and Mokelumne rivers.

3. Treatment of the Yuba River Debris Situation.

Restraining Barriers.

Work at Daguerre Point Cut. During the year the inlet wall at Daguerre Point Cut was raised about 18 inches and covered with a wooden deck and the abutment at the north end of the wall was raised about two feet in height by an earth embankment. The end of this embankment and the sides for some distance back were protected by stone paving. This work was done by contract at a total cost of $10,969.28[1] including inspection expenses, one-half of the expenditure being borne by the state of California.

The toe along the northerly 250 feet of the inlet wall showed signs of becoming undermined by the action of the water at flood tide and was therefore protected in the following manner: Concrete was mixed on the deck of the inlet wall and placed in sacks; after the concrete had thoroughly set the sacks of concrete were lowered into place along the toe of the wall, 4,500 sacks of concrete (containing about 450 cubic yards) being placed in this manner. This work was done under an "additional-labor" proviso of the contract just mentioned. The cost of this work, including inspection expenses, was $2,870.65[1], one-half of which was borne by the state of California.

The brush and trees from the channel immediately above the inlet wall were cut down and burned. This was done to distribute the attack of the water-borne gravel upon the inlet wall. About 25 acres of land were cleared in this way at a total cost of $536.54, one-half of which was borne by the state of California. This work was done under the "additional-labor" feature of the same contract.

Embankment Across Old Channel. Below the training walls an embankment was thrown up across the head of an old channel that threatened to take the flow of the river away from the main channel. The lower reaches of this channel contain a quantity of debris which would gradually pass on down the river were it allowed to become the main channel. This embankment serves as a continuation of the training-wall system. Two smaller channels leading into this old channel were also closed. These embankments contained, in all, approximately 13,000 cubic yards of material, and the total cost of this work, including inspection, expenses, grubbing site, brushing completed embankments, etc., was $4,351.32, one-half of it being borne by the state of California. The cost of throwing up the embankment was $3,892.50, or about 29.9 cents per cubic yard. These embankments were constructed with four-mule teams and scrapers, the teams and scrapers being furnished on an oral agreement at the rate of $7.50 per day for four-mule team with scraper and driver.

Brush Cutting from Channel and Banks. The brush and trees were cut from the channel and banks of the Yuba River for the three miles immediately above Marysville. This was done to concentrate the flood flow effects and thus to aid the river in deepening and rendering permanent its channel through this section and to facilitate high-water escape. The banks were cleared for 50 feet to 100 feet back, and the channel cleared of trees and brush that had lodged in it. This work was done by day labor at a total cost of $887.75, one-half of this amount being borne by the state of California.

Additions to Training Walls. The training walls, or rock levees, which are being built by gold-dredging companies, along the lines desired by the United States for furthering the project ends, were extended during the year. About 3,400 linear feet of training walls were built above Daguerre Point and about 2,300 feet below Daguerre Point. These training walls are being thrown up by the gold dredges. The gold dredges separate the coarse material from the fine and deposit the coarse on top. This furnishes a rock levee with only large cobbles above the natural surface, while the finer material is left beneath the original surface.

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[1] The total work done under this contract amounted to $13,839.93, from which amount the sum of $53.15 was deducted on account of expenses incurred after expiration of time limit of contract.

APPROPRIATIONS.

June 3, 1896	[1]$250,000 00
June 13, 1902	[2]150,000 00
Total	$400,000 00
Received from sales	28,279 48
Grand total	$428,279 48

CONTRACTS IN FORCE.

Raising and Covering with Wooden Deck the Inlet Wall at Daguerre Point Cut, Yuba River.[3]

Name of contractor: Nelson & Bauer.

Date of contract: July 17, 1914.

Date of approval: Emergency contract; approval not required.

Date fixed for commencement: July 27, 1914.

Actual date of commencement: July 27, 1914.

Percentage of completion at end of fiscal year: 100.

Amount of contract: $13,317.72.

Prices per unit:

Article	Unit	Unit prices
Pine timber	M foot b m.	$31 60
Steel channels	Lineal foot	94
Anchor bolts	100 pieces	88 00
Lag screws	100 pieces	6 54
Lag screws	100 pieces	4 65
Wrought washers	100 pieces	39
Wrought washers	100 pieces	22
Concrete	Cubic yard	8 80
Embankment	Cubic yard	50
Slope paving	Square yard	2 00

COMMERCIAL STATISTICS.

See report on Sacramento River.

4. Alleviation of Debris Conditions in the Sacramento and Feather Rivers.

The operations during the fiscal year have been as follows:

The two 20-inch pipe line hydraulic suction dredges *Sacramento* and *San Joaquin*, together with the necessary auxiliary plant, have been operated and maintained for a period of 10.95 months, the latter having been laid up for repairs from September 2 to October 24, 1914, and the former from December 23, 1914, to January 4, 1915; a hired clamshell-bucket dredge was operated from January 14 to May 22, 1915, and constructed a retaining embankment for spoil deposit.

During the year 6,379,529 cubic yards of material have been excavated from the Sacramento River between Collinsville and Rio Vista and placed as the core of a levee on Sherman Island at Baker's Point or wasted on other spoil banks, at a total cost of $246,370.45[4], or 3.8618 cents per cubic yard.

The dredge *Sacramento* removed 3,585,093 cubic yards of material from the river at a total cost of $107,759.55, or 3.00574 cents per cubic yard; 1,249,352 cubic yards of this was placed as part of a proposed levee on Sherman Island at a cost of

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[1] State of California appropriated $250,000 for use with this appropriation at equal rate of expenditure.

[2] State of California appropriated $150,000 for use with this appropriation at equal rate of expenditure.

[3] One-half of cost payable by state of California.

[4] Includes outstanding liabilities.

$53,936.10[1], or 4.31711 cents per cubic yard; and 2,335,741 cubic yards was wasted on spoil banks on the right side of the river at a cost of $53,823.46, or 2.30432 cents per cubic yard.

The dredge *San Joaquin* removed 2,794,436 cubic yards of material from the river, all of which was placed on spoil banks on the right side of the river at a cost of $102,444.84, or 3.66602 cents per cubic yard.

The portion of the levee constructed on Sherman Island at Baker's Point is approximately 6,100 feet in length, 20 feet high, 10 feet wide at the crest and 400 feet at the base, and contains 1,453,965 cubic yards of material, the cost of which has been $93,296.96, or 6.417 cents per cubic yard.

The retaining embankment for spoil deposit constructed by a hired bucket dredge is 18,842 feet long, 6 feet high, and contains 301,472 cubic yards, the cost of which has been $10,020.22, or 3.3237 cents per cubic yard.

The original estimated cost of this project (Rept., June 30, 1907) was $800,000. The report was adopted by congress, June 25, 1910, but during the period between its proposal and adoption reclamation had so increased the value of lands that would have been necessary for spoil banks on the upper rivers, where it had originally been in mind that the dredging would be done, and so concentrated the channel flow to assist in moving deposits downstream, that the cost of doing the work in the upper river would have been increased and the advantages decreased; work was consequently concentrated at the lower end of the river to afford a steeper gradient to the river bottom and a reservoir capacity to absorb the material whose movement downstream was to be thus accelerated. This required digging to a greater depth than was formerly in mind and this in turn, together with the greater exposure to the plant, required larger and more expensive dredges and appurtenant plant than had been included in the figures of the original estimate.

The actual cost, including the cost of the dredging plant, to June 30, 1915, amounts to $885,924.81[2], $444,253.30 of which covered original cost of dredging plant, and $441,671.51[3] have been for maintenance and operation for a mean period of 21.4 months or 38.2 per cent of the operations contemplated in the project, or at a cost of $20,603.45 per month.

As the dredging plant becomes older, maintenance and necessary replacements will require increased expenditure each month, and for the remaining balance of 34.6 months it is estimated that the cost of maintenance and operation of the dredges and appurtenant plant will be $23,000 per month, or $795,800.

APPROPRIATIONS.

By the United States.

Act—

June 25, 1910	*$400,000 00
October 2, 1914 (allotted Oct. 9, 1914)	†60,000 00
March 4, 1915 (allotted May 27, 1914)	†140,000 00
Total	$600,000 00

By the State of California.

State of California appropriated March 1, 1909, for use with this appropriation, and deposited the amount in the United States Treasury July 1, 1911	*$400,000 00
This amount and any further similar funds contributed were accepted and reappropriated by the cited act of congress.	
State of California appropriated June 7, 1913	†200,000 00
Of which $60,000 was deposited to credit of the United States on May 20, 1915, and $140,000 on July 9, 1915.	
Total	$600,000 00

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[1] In addition $22,377.03 was expended in connection with trestle construction for proposed levee.

[2] Includes $22,377.03 expended in connection with trestle construction for proposed levee.

[3] Includes $20,081.65 outstanding liabilities.

Received From Miscellaneous Sources.

For the credit of this appropriation there was received from miscellaneous sources	$757 64
Grand total	$1,200,757 64

CONTRACTS IN FORCE.

For Fuel Oil and Distillate.

Name of contractor: Standard Oil Co.
Date of contract: August 1, 1913.
Date of approval: Emergency contract; not approved.
Date fixed for commencement: August 10, 1913.
Actual date of commencement: August 5, 1913.
Date fixed for completion: Distillate July 31, 1914; fuel oil July 31, 1915.
Percentage of completion at end of fiscal year: 96.
Amount of contract: Indeterminate.
Prices per unit: Fuel oil, $1.05, 95 cents, 80 cents, and 85 cents per barrel; distillate, 6½ cents and 7½ cents per gallon; according to place of delivery.

Lease of Oil Barge.

Name of contractor: A. K. Varney.
Date of contract: May 11, 1914.
Date of approval: Lease; approval not required.
Date fixed for commencement: May 11, 1914.
Actual date of commencement: May 11, 1914.
Date fixed for completion: September 11, 1914.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $300.
Price per unit, $2.50 per day.

Lease of Launch and Barge.

Name of contractor: Charles H. Ehlert.
Date of contract: July 15, 1914.
Date of approval: Lease; approval not required.
Date fixed for commencement: July 15, 1914.
Actual date of commencement: July 15, 1914.
Date fixed for completion: January 14, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $1,200.
Price, per unit: $135 per month for launch and $65 per month for barge.

Lease of Launch.

Name of contractor: Charles H. Ehlert.
Date of contract: July 15, 1914.
Date of approval: Lease; approval not required.
Date fixed for commencement: July 15, 1914.
Actual date of commencement: July 15, 1914.
Date fixed for completion: October 14, 1914.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $300.
Price, per unit: $100 per month.

Furnishing Rubber Dredger Sleeves.

Name of contractor: Bowers Rubber Works.
Date of contract: August 18, 1914.
Date of approval: Emergency contract, not approved.
Date fixed for commencement: August 28, 1914.
Actual date of commencement: September 20, 1914.
Date fixed for completion: October 17, 1914.

Percentage of completion at end of fiscal year: 100.
Amount of contract: $4,488.
Price per unit: $44.88.

Lease of Barge.

Name of contractor: Charles H. Ehlert.
Date of contract: October 1, 1914.
Date of approval: Lease; approval not required.
Date fixed for commencement: October 1, 1914.
Actual date of commencement: October 1, 1914.
Date fixed for completion: March 31, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $390.
Price, per unit: $65 per month.

Lease of Launch.

Name of contractor: Charles H. Ehlert.
Date of contract: October 15, 1914.
Date of approval: Lease; approval not required.
Date fixed for commencement: October 15, 1914.
Actual date of commencement: October 15, 1914.
Date fixed for completion: June 30, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $850.
Price, per unit: $100 per month.

Lease of Oil Barge.

Name of contractor: Oakland Launch and Tugboat Co.
Date of contract: December 11, 1914.
Date of approval: Lease; approval not required.
Date fixed for commencement: December 17, 1914.
Actual date of commencement: December 17, 1914.
Date fixed for completion: June 16, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $600.
Price, per unit: $100 per month.

Lease of Gasoline Launch.

Name of contractor: Oakland Launch and Tugboat Co.
Date of contract: January 2, 1915.
Date of approval: Lease; approval not required.
Date fixed for commencement: January 11, 1915.
Actual date of commencement: January 11, 1915.
Date fixed for completion: June 30, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $765.
Price, per unit: $135 per month.

Lease of Bucket Dredge.

Name of contractor: Suisun Dredging Co.
Date of contract: January 9, 1915.
Date of approval: Lease; approval not required.
Date fixed for commencement: January 14, 1915.
Actual date of commencement: January 14, 1915.
Date fixed for completion: May 29, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $12,500.
Price, per unit: $110 per day.

Lease of Barge.

Name of contractor: Oakland Launch and Tugboat Co.
Date of contract: March 29, 1915.
Date of approval: Lease; approval not required.
Date fixed for commencement: April 1, 1915.
Actual date of commencement: April 1, 1915.
Date fixed for completion: September 30, 1915.
Percentage of completion at end of fiscal year: 50.
Amount of contract: $390.
Price, per unit: $65 per month.

Commercial Statistics.

See report on Sacramento River, California.

EXTRACT FROM THE ANNUAL REPORT OF THE CHIEF OF ENGINEERS TO THE SECRETARY OF WAR.

WAR DEPARTMENT,
OFFICE OF CHIEF OF ENGINEERS,
Washington, September 28, 1915.

Sacramento-Feather Rivers Board.

This board has charge of the improvement of the Sacramento and Feather rivers, which drain the northern portion of the central valley of California. The exact line of demarcation between the Sacramento and San Joaquin rivers is not determinable with definiteness since, with their common delta, they merge into one another, but the line of the Cosumnes River furnishes as good a boundary as any and is generally assumed therefor. For more detailed description of the limits in other directions, see page 1461 for corresponding description of the third San Francisco, California, district.

The river and harbor act, approved June 3, 1896, required the Secretary of War to appoint the Sacramento-Feather River Board, and provided that the same should consist of three engineers of the United States Army. During the year this board consisted of Lieut. Col. Thos. H. Rees, Corps of Engineers (senior member); Maj. R. R. Raymond, Corps of Engineers; Maj. L. H. Rand, Corps of Engineers (recorder), since August 7, 1914; and Maj. S. A. Cheney, Corps of Engineers (recorder), prior to that date. The recorder exercises immediate supervision over the work.

Improvements.

1. Sacramento and Feather rivers, California (general improvement), page 1457. For board's report, see pages 3345 to 3348, inclusive.

1. Improving Sacramento and Feather rivers, California (general improvement).

Location. The Sacramento River rises in the Trinity Mountains, in northern California, flows about 375 miles in a southerly direction and empties into Suisun Bay. It is navigable from Red Bluff to its mouth, a distance of 261 miles, and this is the portion under improvement. The Feather River heads on the crest of the Sierra Nevadas, flows in a southwesterly course and empties into the Sacramento River about 20 miles (by river) above Sacramento. The lower 30 miles from Marysville to its mouth is navigable. (See U. S. Geological Survey, "Topographic Map of the Sacramento Valley, California.")

Original Condition. Before improvement, navigation on the Sacramento River above Colusa, 150 miles above the mouth, was very difficult on account of snags and bars, and in 1875 it was navigated regularly only as far as Jacinto, 186 miles above the mouth, although it had been navigated regularly to Red Bluff, 261 miles above the mouth, before that time. Below Sacramento there was said to be less than seven feet of water on shoals, and river steamers were unable to reach Sacramento without lightening their cargoes. Feather River was practically unnavigable at low-water stage on account of deposits of mining debris.

Previous Projects. The original project adopted by river and harbor act of March 3, 1875, was modified by river and harbor acts of August 7, 1882, December 21, 1889, July 13, 1892, and amended by river and harbor act of August 18, 1894. The amount expended on all projects prior to the adoption of the present project was $740,860.21. For scope of previous projects, see Appendix, page 1985.

Present Project. Sacramento River is being improved under plans adopted as follows:

Below Sacramento, with a view to securing a least channel depth of seven feet by means of a system of wing dams at or near shoals, supplemented by dredging, if necessary, at an estimated cost of $280,000, adopted by the river and harbor act approved March 3, 1899, in accordance with the reports printed in House Document No. 186, Fifty-fifth Congress, second session, and House Document No. 48, Fifty-fifth Congress, third session.

Above Sacramento, with a view to securing a channel four feet deep up to Colusa, three feet deep from Colusa to Chico Landing, and such depth as is practicable from Chico Landing to Red Bluff, at an estimated annual expenditure of $25,000, adopted by the river and harbor act, approved July 25, 1912, in accordance with the report printed in House Document No. 76, Sixty-second Congress, first session.

The tidal range is six feet at the mouth of the river, and during extreme low water about one foot at Sacramento, at which latter point irregular flow conditions cause a variation of about 20 feet in levels. The distance from the mouth to Sacramento is 60 miles, to Colusa 150 miles, to Chico Landing 201 miles, and to Red Bluff 261 miles. In the report printed in House Document No. 48, Fifty-fifth Congress, third session, a board of engineers expressed the opinion that no permanent improvement of the Feather River could be carried out at reasonable or justifiable cost until the flow of sand and other mining detritus had been stopped. Since the adoption of this report in 1899 no work has been done for the improvement of Feather River.

Operations and Results Prior to Fiscal Year. Prior to the fiscal year snagging had been done annually on the upper and lower Sacramento River; temporary wing dams built and occasional dredging done on the upper Sacramento River; more permanent wing dams built and repairing done to the same, and occasional dredging resorted to on the lower Sacramento River. Snagging had been done and temporary wing dams had been built at various times on the Feather River. Since 1902 the project depths had been maintained on the Sacramento River, except at a few places for a few days, pending restoration work, during low-water periods. The dangers to navigation, especially above Colusa, due to snags and other obstructions, had been greatly reduced, and conditions in the lower regions, due to obstructions of mining debris, had been greatly alleviated. Prior to the beginning of the fiscal year, $363,318.13 had been spent on the present project, of which $37,212.71 was considered to be for original work, and $326,105.42 for maintenance.

Operations and Results During the Fiscal Year. The Sacramento River was snagged from its mouth to Chico Landing, a distance of about 201 miles. Some 1,888 snags were removed from the river and destroyed, and 491 overhanging trees were cut from the banks. This work was done at a cost of $17,561.69. Four new wing dams were built, and 17 wing dams were repaired, at a cost of $8,857.38. Work on a bank protective group of piling at Collins Eddy, Sacramento River, was done at a cost of $2,144.44. All the above work was done with hired labor and with government plant. Dredging was resorted to in two places in the Sacramento River—Sacramento Bend and opposite Knox's lumber wharf at Sacramento. At Sacramento Bend a channel 200 feet wide and 1,000 feet long was dredged to a depth of nine feet at a cost of $1,354.12. Opposite Knox's lumber wharf, a channel 125 feet wide and 600 feet long was dredged to a depth of nine feet, at a cost of $519.87. This dredging was done by a dredge hired at the rate of $135 per day of 22 hours. The project depths on the Sacramento River were maintained during the year, except for a few days at one point. All the work done during the year was for maintenance, and the total expenditures were $33,354.35.

Condition at the End of Fiscal Year. On the Sacramento River, the project depths of seven feet up to Sacramento, four feet up to Colusa, three feet up to Chico Landing, and about two feet from Chico Landing to Red Bluff, are available, and on the Feather River a depth of about two feet is available. These are the maximum drafts which may be carried over these portions of the rivers at low stages of the rivers.

At the end of the fiscal year $396,672.48 had been expended on the existing project, of which $37,212.71 were for original work and $359,459.77 for maintenance.

Local Cooperation. No local cooperation was imposed by law, but nevertheless it has been quite extensive. The state of California has done extensive bank protection work, built wing dams, made cut-offs, and done various other river work. The cities of Sacramento and Marysville have built municipal wharves and freight sheds, and reclamation districts have dredged much material from the river for levees, to the material aid of navigation. It is estimated that this work has amounted to approximately $3,950,000 on these two rivers.

Proposed Operations. It is proposed to maintain the project depths in the Sacramento River by snagging, building wing dams at shoals and by occasional dredging. The funds, available June 20, 1915, will be exhausted June 30, 1916. The following estimate is submitted:

Above Sacramento:		
Operation of snag boat, six months, at $3,750 per month	$22,500	
Occasional and irregular dredging, estimated at	1,000	
Repairs and additions to wing dams, estimated at	1,500	
Below Sacramento:		$25,000
Operations of snag boat, one month, at $3,750 per month	$3,750	
Occasional and irregular dredging, estimated at	3,000	
Building new wing dams, making repairs and adding rock to existing wing dams, estimated at	12,750	
Care of snag boat while idle, five months, at $100 per month	500	
		20,000
Construction of new snag boat, estimated at		60,000
		$105,000

(An estimate is submitted for a new snag boat because the old snag boat is practically worn out and obsolete.)

Commercial Statistics. The commerce on the Sacramento River consists mostly of grain, lumber, fruit, vegetables, and general merchandise. Following is a comparative statement of the amount and value of the commerce for the last three calendar years:

COMPARATIVE STATEMENT.

Calendar year	Short tons	Value
1912	477,292	$27,755,325
1913	733,594	35,856,791
1914	721,090	38,211,760

FINANCIAL SUMMARY.

Amount expended on all projects to June 30, 1915:	
New work	$37,212 71
Maintenance	359,459 71
New work and maintenance	[1]740,860 21
Total	$1,137,532 69
Amount expended during fiscal year ending June 30, 1913:	
New work	
Maintenance	34,078 94

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[1] Figures reported last year decreased 80 cents, due to refund of overpayment made in that fiscal year.

Amount expended during fiscal year ending June 30, 1914:	
New work	----------
Maintenance	[1]$41,544 92
Amount expended during fiscal year ending June 30, 1915:	
New work	----------
Maintenance	33,354 35

APPROPRIATIONS.

(For last five fiscal years only.)

February 27, 1911	$25,000 00
July 25, 1912	65,000 00
March 4, 1913	40,000 00
March 4, 1915	60,000 00
July 1, 1914, balance unexpended	[2]29,763 73
Amount allotted from river and harbor act approved March 4, 1915	60,000 00
	$89,763 73
June 30, 1915, amount expended during fiscal year, for maintenance of improvement	33,354 35
July 1, 1915, balance unexpended	$56,409 38
July 1, 1915, outstanding liabilities	3,660 04
July 1, 1915, balance available	$52,749 34
Amount that can be profitably expended in fiscal year ending June 30, 1917, for maintenance and improvement	[3]$105,000 00

IMPROVEMENT OF RIVERS AND HARBORS IN THE THIRD SAN FRANCISCO, CALIFORNIA, DISTRICT.

This district embraces the rivers and waterways within the area drained by the Sacramento and San Joaquin rivers, above their confluence at head of Suisun Bay. It is entirely within the state of California and extends from the crest of the Sierra Nevada Mountains on the east to the Coast Range on the west, and from the Cascade Range and the Oregon boundary on the north to the Tehachapi Mountains on the south.

District officer: Major S. A. Cheney, Corps of Engineers, until August 7, 1914, and Major L. H. Rand, Corps of Engineers, since that date.

Division Engineer: Lieutenant Colonel Thos. H. Rees, Corps of Engineers.

Improvements.

	Page.
1. San Joaquin River, California	1461
2. Stockton and Mormon Channels (diverting canal), California	1468
3. Mokelumne River, California	1470

For district officer's report giving additional details regarding works in this district, see pages 3349 to 3354.

1. San Joaquin River.

This river is under improvement under several separate projects, the later of which in point of time partially overlap the earlier, and as they become accomplished will supplant the earlier to the corresponding extent. Even, however, where they overlap, the earlier are, pending completion of cooperative requirements for the later, the basis of work. To intelligibly present the subject as a whole the separate projects are carried along seriatim under the usual headings with literal cross references as—

(*a*) Including Stockton and Mormon Channels, maintenance (nine-foot channel).

(*b*) Nine-foot channel and cut-offs.

(*c*) Fremont Channel and McLeod Lake, arms of Stockton Harbor.

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[1] Expended prior to March 3, 1899, before which time records do not indicate expenditures separable into new work or maintenance.

[2] Increased 80 cents due to refund of overpayment.

[3] Exclusive of the balance unexpended July 1, 1915.

Location. (*a*) Its several forks and branches rising in the high Sierras unite to form the San Joaquin River, which then flows southwesterly about 143 miles to Herndon 10 miles northwest of Fresno; thence westerly 48 miles by river to Firebaugh; thence northwesterly 166 miles to mouth of Stockton Channel, 2.5 miles west from Stockton; thence in same general direction 42.5 miles farther to Suisun Bay, thus aggregating about 400 miles in length. Mormon Channel, a branch of Stockton Channel, extends through southerly part of Stockton. Hills Ferry, 87 miles above Stockton Channel, or 129 miles above the mouth of the river, is upper limit of the portion of the river included in the project. In the lower 34 miles of river, there is a governing depth of 15 feet; the only work done in this portion has been the elimination of a large bend by means of a cut-off. The lower 29 miles of channel, though not specifically excluded from the project, is ample to meet all needs of the navigation without any improvement. It should be noted that between the mouth of the river and San Francisco Bay the governing depth of present used navigation channel is about 10 feet, although there is an unmarked channel having a governing depth of 15 feet at mean low water.

(*b*) This project covers San Joaquin River and Stockton channels from the mouth of the former to the head of the latter at the city of Stockton, a distance of 45 miles. These channels are also included under preceding paragraph, and the remarks therein as to lower river conditions apply.

(*c*) Fremont Channel and McLeod Lake, included in this project, form an arm of Stockton Channel, branching off therefrom at a point about 1,500 feet west of El Dorado Street, Stockton, and extend northeasterly about 2,000 feet, all of which is included in the project, forming an important part of the city's harbor. Their distance above the mouth of the river is 45 miles.

Original Condition. (*a*) The lower 34 miles of channel have always been broad and deep. In spite of numerous sharp bends, the 15 miles of channel above, including Stockton Channel, was navigated at low water by boats drawing six feet. The river above Stockton, although obstructed by snags, was navigated by light draft steamboats to Hills Ferry about half the year, and to Firebaugh, 79 miles higher, for a few weeks at high water. At annual high-water periods much silt was deposited in Stockton and Mormon channels and in the river below. Portions of the river flow were diverted through side channels.

(*b*) When this project became operative in 1914, the governing depth was about seven feet. The width between banks was in excess of 200 feet at all except a few reaches near Stockton, where it was as small as 160 to 175 feet.

(*c*) At the time of adoption of the project, the area included therein was generally less than five feet deep at mean low water, a depth insufficient for use by the river boats. (See map in H. Document 581, 62d Congress, second session.)

Previous Projects. (*a*) There was no project for the San Joaquin previous to the adoption of the present existing project.

(*b*) There were two projects prior to the present project, the one for "Improving San Joaquin River, including Stockton and Mormon channels, nine-foot channel, maintenance," and one for "Stockton and Mormon channels (diverting canal)," both of which are still in force and reported on herewith. Prior to 1914, when present project became operative, there had been spent on the first project $641,837.34, and on the second project $245,743.41, a total of $887,580.75. Of the former sum about $60,000 was spent for dredging Mormon Channel, and $29,000 for work in upper river, which are not included in the present project.

(*c*) There was no previous project which included the area under the present project.

Present Project. (*a*) The date of adoption of the present project is taken as August 14, 1876, when the first appropriation for improving the San Joaquin River was made. The project was not based on any printed document, and the records seem to show that the plan of improvement was not well defined at first, but became fairly definite about 1881. The objects to be attained were as follows:

1. To improve certain constricted portions of Stockton Channel and of the San Joaquin River in the three miles just below by dredging to a mean low-water depth of nine feet and a bottom width of 100 feet, all the river below being in excess of these dimensions.

2. To establish and maintain, by dredging, a channel in Mormon Channel from its junction with Stockton Channel up 1.7 miles to Millers Warehouse, Center Street, Stockton, 80 feet wide and four feet deep at low water.
3. To reduce the curvature of the channel by cutting off sharp bends.
4. To make temporary improvements in the low-water channel of the "upper river," above Stockton Channel to Hills Ferry, a distance of 87 miles. The improvements included snagging, removal of overhanging trees and construction of brush wing dams, and were intended to facilitate light-draft steamboat navigation during the high and mean stages of water, it being considered impracticable to maintain a navigable channel during low water.
5. It was additionally provided (river and harbor act of August 11, 1888) to partially close the side channels, Laird's Slough and Paradise Cut, by weirs, and thereby confine their low-water flow to one main channel.

Tidal influence at low water extends about 65 miles above the mouth of the river; its mean range at the mouth is about six feet, and at Stockton about three feet.

Since 1898 the operations under this project have been restricted to maintenance of the river and of Stockton and Mormon channels below Stockton. There is no estimate of available record for annual maintenance.

(*b*) The present project, adopted June 25, 1910 (H. Document 1124, 60th Congress, second session), has for its objects:

1. To improve Stockton Channel and the San Joaquin River by dredging deficient portions to a mean low-water depth of nine feet and to a bottom width of 200 feet, all such deficient sections being within Stockton Channel and the first few miles of river below.
2. To make two cut-offs designated "B" and "C."

The approved estimate of cost of the improvement is $199,632, and of maintenance $25,000, annually.

The length of the San Joaquin River included in the project is 42.5 miles, and of Stockton Channel 2.5 miles.

(*c*) The present project was adopted July 25, 1912, in accordance with House Document No. 581, Sixty-second Congress, second session. Its objects are:

1. To establish, by dredging, a depth of nine feet at mean low water over area included, and
2. To maintain the same.

The estimated cost of "1" was $11,000 and of "2" was $500 annually.

Operations and Results Prior to Fiscal Year. (*a*) The expenditures have resulted in improved channels that have fairly met the needs of commerce. Cost of new work and of maintenance were not kept separate prior to 1898, up to which time the total expenditure *for new work and for maintenance* had been $384,424.58; since then all expenditures have been for maintenance, and have amounted to $257,412.26, making a total expenditure prior to fiscal year since original adoption of project, $641,836.84. (Reduction of 50 cents from figures of 1914 report due to refund of overpayment made in that fiscal year.)

(*b*) There were no operations and no expenditures prior to the fiscal year, as proviso of act adopting project, which required that no part of the funds be expended until titles to right of way required be first conveyed free of cost to the United States, was not complied with until July 8, 1914.

(*c*) The original dredging was completed in March, 1914, at a cost of $11,000, resulting in the approved depth over the entire area. There had been no maintenance operations prior to fiscal year.

(*a*), (*b*) and (*c*). Total expenditures for new work since 1898[1] are $11,000 and for maintenance $257,412.26. Total expenditures for new work and for maintenance since adoption of original project are $652,836.84.

Operations and Results During Fiscal Year. (*a*) Contract was entered into for dredging shoals in the lower portion of Stockton Channel and in the San Joaquin River just below. Under this contract a total of 144,735 cubic yards was removed and pumped ashore. The total expenditure has been $17,331.69, all of which was for maintenance.

(*b*) The cut-off "C" was about nine-tenths completed during fiscal year. The work was done by a leased clam-shell dredging plant. Final payment therefor has not been made. The total amount expended during the fiscal year was $20,411.02, all of which was for new work.

(*c*) There have been no operations during fiscal year, as none was necessary.

The total expenditures during the fiscal year on all three subdivisions, (*a*), (*b*), and (*c*), was $37,742.71, of which $17,331.69 was for maintenance and $20,411.02 for new work.

Conditions at the End of Fiscal Year. (*a*) On June 30, 1915, there exists the full project width of 80 feet and mean low water depth of four feet in Mormon Channel, the project width of 100 feet and mean low water depth of nine feet in San Joaquin River and Stockton Channel from the mouth of the former to the head of the latter in city of Stockton, except at a few crossings, where the governing depth is about seven feet. This depth meets requirements of all boats now in use in the river. There is no complete estimate of available record, so that no definite percentage of completion can be stated. At the end of the fiscal year the total expenditures since 1898[1] have been for new work nil and for maintenance $274,743.95, or a total expenditure since original adoption of the project of $659,168.53.

(*b*) The project is 10 per cent completed and the total expenditures thereunder to end of fiscal year are $20,411.02, all of which were for new work.

The cut-off "C" is now used by all the San Joaquin River traffic. It has the effect of shortening the distance for boats between Stockton and points below, including San Francisco, by about 0.31 mile, of eliminating a bend in the river and also of facilitating the flow of tides, consequently increasing their scour, depended upon to maintain the channel.

(*c*) No survey of the area has been made recently, but it is believed that there exists the approved depth of nine feet at mean low water over the whole area. The dredged area constitutes a much needed addition to the harbor of Stockton. The total expenditures on this project to end of fiscal year were $11,000, all for new work.

(*a*), (*b*), and (*c*). Since 1898[1] the total expenditures to end of fiscal year have been for new work $31,411.02. and for maintenance $274,743.95, and a total for both new work and maintenance since adoption of original project, $690,579.55.

Local Cooperation. (*a*) It was required (river and harbor act, July 13, 1892) that right of way for two cut-offs be furnished to the United States free of cost before any part of the appropriation should be expended. This proviso was complied with and the cut-offs made the year following. The following work was done voluntarily by others than the government:

Right of way for Head Reach Cut-off, made in 1891, was furnished by private interests.

Three cut-offs were made by state of California (see Annual Report for 1900, pt. 4, p. 4224).

The city of Stockton formerly maintained a dredge that was used near the city (see Annual Report for 1882, pt. 3, p. 2537), and has built extensive concrete bulkheads and wharves at Stockton.

In March, 1910, San Joaquin County completed the dredging of a shoal in "The Narrows," available government funds having become exhausted.

The dam at Paradise Cut is at present, and for several years past has been, maintained by local interests for purpose of correcting flood conditions.

From 1908 to 1912, before completion of the Stockton and Mormon channels diverting canal, the city of Stockton obtained use of the "Boggs Tract" by lease and diverted the flow of Mormon Slough over it, thereby preventing large deposits of silt in the navigable waters below.

At present there are no cooperative requirements that have not been met.

(*b*) In compliance with act adopting project, rights of way for cut-offs "B" and "C" were conveyed free of cost to the United States and proceedings are under way to procure the additional lands necessary for widening the river.

(*c*) It was required in act adopting the project for improvement (p. 9, H. Document No. 581, 62d Congress, second session), that local interests furnish satisfactory evidence to Secretary of War that adequate bulkheads and terminals be provided free of cost to the United States. A statement of status of compliance with this provision was approved by the Secretary of War, September 11, 1912.

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[1] See Operations and results prior to fiscal year (*a*).

Effect of Improvement. The increased facilities have met the needs of commerce and made possible uninterrupted schedules for water transportation, which have undoubtedly largely decreased transportation costs.

Proposed Operations. (*a*) The funds estimated will be used in supplementing those now available for the necessary dredging and snagging operations. It is probable that the balance available will be expended by January 1, 1917.

(*b*) Funds in hand are adequate to meet all probable expenditure necessary prior to June 30, 1917.

(*c*) With the funds recommended as a profitable expenditure it is proposed to dredge shoals when they shall have formed.

The balance available, $500, is inadequate to justify an operation, and can not be expended advantageously unless supplemented with additional funds, in which case it will probably be expended by June 30, 1917.

Commercial Statistics. The commerce for the calendar year 1914 amounted to 772,156 short tons, valued at $35,479,741, and consisted principally of grain, potatoes, onions, beans, and general merchandise.

COMPARATIVE STATEMENT.

Calendar year	Short tons	Value
1912	632,591	$38,854,539
1913	820.399	38,341,174
1914	772,156	35,479,741

FINANCIAL SUMMARY.

SAN JOAQUIN RIVER, INCLUDING STOCKTON AND MORMON CHANNELS (MAINTENANCE) AND FREMONT CHANNEL AND M'LEOD LAKE.

Amount expended on all projects to June 30, 1915:	
New work	$11,000 00
Maintenance	659,168 53
Total	$670,168 53
Amount expended during fiscal year ending June 30, 1913	3,327 39
New work	175 00
Maintenance	3,152 39
Amount expended during fiscal year ending June 30, 1914	35,118 85
New work	10,825 00
Maintenance	[1]24,293 85
Amount expended during fiscal year ending June 30, 1915	17,331 69
New work	----------
Maintenance	17,331 69

Reduction of 50 cents[1] from figures of 1914 report, due to refund of overpayment made in that fiscal year.

APPROPRIATIONS.

(For last five fiscal years only.)

Feb. 27, 1911	$25,000 00
July 25, 1912	51,000 00
Mar. 3, 1913	25,500 00
July 1, 1914, balance unexpended	[1]$58,344 41
June 30, 1915, amount expended during fiscal year for maintenance of improvement	17,331 69
July 1, 1915, balance unexpended	$41,012 72
July 1, 1915, outstanding liabilities	272 50
July 1, 1915, balance available	$40,740 22

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[1] Increased by 50 cents due to refund of overpayment.

Amount that can be profitably expended in fiscal year ending June 30, 1917, for maintenance of improvement	[1]$11,000 00

SAN JOAQUIN RIVER (NINE-FOOT CHANNEL AND CUT-OFF).

Amount expended on all projects to June 30, 1915:	
New work	$20,411 02
Maintenance	---------

Amount expended during fiscal year ending June 30:

	1913	1914	1915
New work	----------	------------	$20,411 02
Maintenance	----------	------------	----------

APPROPRIATIONS.

(For last five fiscal years only.)

March 4, 1913	$159,632 00
July 1, 1914, balance unexpended	$199,632 00
Deduction on account of transfer under river and harbor act approved March 4, 1915	30,000 00
	$169,632 00
June 30, 1915, amount expended during fiscal year for works of improvement	20,411 02
June 1, 1915, balance unexpended	$149,220 98
July 1, 1915, outstanding liabilities	2,090 33
July 1, 1915, balance available	$147,130 65
Amount (estimated) required to be appropriated for completion of existing project	[1]$30,000 00

CONSOLIDATED.

Amount expended on all projects to June 30, 1915:	
New work	$31,411 02
Maintenance	659,168 53
Total	$690,579 55

Amount expended during fiscal year ending June 30:

	1913	1914	1915
New work	$175 00	$10,825 00	$20,411 02
Maintenance	3,152 39	[2]24,293 85	17,331 69
Totals	$3,327 39	$35,118 85	$37,742 71

APPROPRIATIONS.

(For last five fiscal years only.)

Feb. 27, 1911	$25,000 00
July 25, 1912	51,000 00
Mar. 4, 1913	185,132 00
July 1, 1914, balance unexpended	[3]$257,976 41
Deduction on account of transfer under river and harbor act approved March 4, 1915	30,000 00
	$227,976 41

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[1] Exclusive of the balance unexpended July 1, 1915.

[2] Reduction of 50 cents from figures of 1914 report, due to refund of overpayment made in that fiscal year.

[3] Increased by 50 cents due to refund of overpayment.

June 30, 1915, amount expended during fiscal year:		
For works of improvement	$20,411 02	
For maintenance of improvement	17,331 69	37,742 71
July 1, 1915, balance unexpended		$190,233 70
July 1, 1915, outstanding liabilities		2,362 83
July 1, 1915, balance available		$187,870 87
Amount (estimated) required to be appropriated for completion of existing project		[1]$30,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1917, for maintenance of improvement		[1]$11,000 00

2. Stockton and Mormon Channels (Diverting Canal).

Location. The Calaveras River separates at Bellota, 14 miles east and six miles north of Stockton. The north channel, still called Calaveras River, flows thence westerly two miles north of Stockton and empties into the San Joaquin River two and one-tenth miles below the mouth of Stockton Channel. The south channel, Mormon Slough, flowed through the southern part of Stockton to Stockton Channel. The length of Stockton Channel is two and five-tenths miles and of Mormon Channel one and seven-tenths miles, a total length of four and two-tenths miles. They extend from 42.5 to 45 miles above the mouth of the river. The extent and location of works for improving these channels is given under "Present Project" below.

Original Condition. The north branch of the Calaveras River, which formerly carried most of the discharge of the stream, had become checked with silt in recent years and Mormon Slough had become the principal branch. During annual freshets there were deposited large quantities of silt in the quiet waters of Mormon and Stockton channels. This necessitated extensive dredging, which constituted nearly two-thirds of all the work done under the project—(*a*) under San Joaquin River. The cost was increasing, due to increasing height of levees and increasing value of land upon which to deposit material dredged.

Previous Projects. There was no project prior to the present one for diverting the flow of Mormon Slough. See the project "For improving San Joaquin River, nine-foot channel, maintenance," page 1461.

Present Project. The object of the present project is to divert the waters of Mormon Slough by means of the works set forth below and thereby prevent their load of debris from being deposited in Stockton and Mormon channels. This project includes the construction of a dam three miles east of Stockton across Mormon Slough, a canal leading thence northwesterly four and sixty-three one-hundredths miles to north branch of Calaveras River, and the enlargement of cross-section of the latter for a distance of five miles to its mouth, at San Joaquin River. The project also includes construction of certain bridges over canal. This project was adopted by river and harbor act of June 13, 1902. It provided that the work be done in accordance with report thereon. (H. Document No. 152, 55th Congress, third session.) The final approved estimate for the work is $280,395. No estimate for annual cost of maintenance was made. The first (and only) appropriation for that purpose was made March 4, 1913, in lump sum for this and two other projects. It was anticipated that the maintenance would consist of repairs to the dam or levee and in clearing the canal of undergrowth.

Operations and Results Prior to Fiscal Year. The works as originally specified were about 85 per cent completed, at a total expenditure of $242,119.52 for new work and $4,048.89 for maintenance, or an aggregate of $246,168.41. The expenditures resulted in the construction of the works as originally specified, except that the amount of channel excavation was about 17 per cent less than specified. From the appropriations for improvement there was expended for maintenance, including repairs to bridges and cutting of thistles along the canal, $3,623.89, most of which was spent prior to June 30, 1911. From the $1,000 appropriated for maintenance

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[1] Exclusive of the balance unexpended July 1, 1915.

$425 had been expended prior to fiscal year for exterminating squirrels, destroying thistles, and for administrative work.

Operations and Results During Fiscal Year. The sum of $334.26 was spent during the year for maintenance, $59.26 from original improvement appropriations, and $275 from maintenance appropriation, of which $84.26 was expended for administration and $250 by oral agreement for a particular piece of work, which resulted in keeping down undergrowth along the canal.

Condition at End of Fiscal Year. The project work is about 85 per cent completed, though considerable deterioration has taken place since completion of excavation, due to formation of deposits in the canal bed. The work for the time being prevents formation of most of the silt deposits in Stockton and Mormon channels, thereby saving expensive annual dredging. It is believed that there exist the mean low water governing depths of about eight feet in Stockton Channel and in excess of four feet in Mormon Channel. The total expenditures to end of fiscal year amount to $246,502.67, of which $242,119.52 was for improvement and $4,383.15 was for maintenance.

Local Cooperation. It was required that right of way for canal be furnished the United States free of cost, either by city of Stockton or state of California. This was done by them jointly. Certain work has been done by city of Stockton or San Joaquin County, or both, in maintaining bridges across the canal.

Effect of Improvement. The results expected, in diverting the flow of Mormon Slough, have, to a great extent, been realized, although during flood periods some of the water overflows the south bank above the dam and discharges into Mormon and Stockton channels, thereby causing deposits.

Proposed Operations. With the funds estimated and those on hand, it is proposed to remove deposits and keep down undergrowth in the channel sections so far as the same may seem advisable. The available funds will probably be expended by June 30, 1916.

Commercial Statistics. See report on San Joaquin River, Cal., page 1466.

FINANCIAL SUMMARY.

Amount expended on all projects to June 30, 1915:	
New work	$242,119 52
Maintenance	4,383 15
Total	$246,502 67
Amount expended during fiscal year ending June 30, 1913:	
New work	----------
Maintenance	1,255 66
Amount expended during fiscal year ending June 30, 1914:	
New work	----------
Maintenance	425 00
Amount expended during fiscal year ending June 30, 1915:	
New work	----------
Maintenance	334 26

APPROPRIATIONS.

(For last five fiscal years only.)

March 4, 1913	[1]$1,000 00
July 1, 1914, balance unexpended	$35,234 92
June 30, 1915, amount expended during fiscal year for maintenance of improvement	334 26
July 1, 1915, balance unexpended	$34,900 66
Amount that can be profitably expended in fiscal year ending June 30, 1917, for maintenance of improvement	[2]$10,000 00

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[1] Appropriated for "Improving San Joaquin River, California," and allotted for maintenance work.

[2] Exclusive of balance unexpended July 1, 1915.

3. Mokelumne River.

Location. The Mokelumne River rises near the crest of the Sierra Nevadas and flows southwesterly 119 miles to the town of Woodbridge; thence northerly about nine miles to the Galt-New Hope bridge; thence northwesterly, westerly, and southerly eight miles by river to New Hope Landing, where it separates, afterwards reuniting below in a southerly direction nine miles via North Fork and 14 miles via South Fork (forming Staten Island). The river then flows southerly four miles and empties into the San Joaquin 20 miles above the mouth of the latter at Suisun Bay, a total distance of 140 miles via North Fork or 145 miles via South Fork. (See U. S. Geological Survey topographic map, Sacramento Valley scale 1/250,000.) The river lies generally about midway between the cities of Sacramento and Stockton.

Original Conditions. In the lower portion of their courses the two channels are tidal estuaries, tidal action extending to a little above the Galt-New Hope bridge, the head of navigation. All the North Fork was reported to be in good navigable condition, but the South Fork was obstructed by snags and overhanging trees in the 1½ miles just below New Hope Landing. There were also many snags and overhanging trees in portion of rivers between New Hope Landing and Galt-New Hope bridge. A bar was also reported extending across the river at mouth of Cosumnes River. Exact widths and depths prevailing originally are not given. (Annual Report for 1882, pt. 3, pp. 2638 and 2639.)

Previous Projects. None.

Present Projects. The present project was adopted July 5, 1884. It has for its object to maintain a channel suitable to the needs of navigation by means of removal of snags and obstructions and occasional dredging of shoals. The mean low-water depths at present contemplated (considered sufficient for needs of navigation) are as follows:

Location	Depth	Miles
Mouth of river to lower junction North and South Fork	9	4
Lower junction North and South forks to Snodgrass Slough via North Fork	9	8
Snodgrass Slough to upper junction North and South forks	6	1
Lower junction North and South forks to upper junction of same at New Hope Landing via South Fork	9	14
New Hope Landing to Galt-New Hope bridge	3	8

These depths in general prevail, but there is shoaling at New Hope Landing. The mean daily range of tide at low river stages is about three feet. Maximum flood stage at Galt-New Hope bridge is about 17 feet above low water, with annual variation of about 12 feet.

The first estimate made in 1882 of $8,250, which formed a basis for the project, was for clearing the river of all obstructions and improvement of shoals near mouth of Cosumnes River. There is no estimate for annual maintenance of available record.

Operations and Results Prior to Fiscal Year. The work done has consisted largely of removing snags and overhanging trees and of dredging shoals. Of total appropriations of $31,000, $29,902.05 was expended previous to current fiscal year, $21,402.05 of which was for maintenance and $8,500 for new work. The needs of navigation have been fairly met.

Operations and Results During the Fiscal Year. No work has been done on the Mokelumne River during the current fiscal year, none being required. Of the money expended during current year, $243.20, $200 was for administrative work and $43.20 was to cover outstanding liabilities from preceding year.

Conditions at the End of Fiscal Year. No survey has been made since the recent high water, but it is believed that at end of fiscal year there exist the governing depths tabulated above under "Present Project," reference to which is made to avoid extensive repetition here. The channel is believed to be free of obstructions to the head of navigation. Total expenditures to end of fiscal year are $30,145.25.

Local Cooperation. There are no local cooperative requirements of current interest.

Effect of Improvement. The improvements have made possible regular scheduled steamboat operation to the Galt-New Hope bridge. The effect upon transportation costs could be stated only after such extended investigation as is impracticable, but is presumably one of reduction.

Proposed Operations. It is proposed to expend the funds for which estimate is submitted for continuing miscellaneous maintenance operations as need arises, to meet needs of navigation, including dredging, removal of snags, construction of temporary wing dams, etc. The available funds will probably be expended by March 1, 1916.

Commercial Statistics. The commerce for the calendar year 1914 amounted to 69,783 short tons, valued at $3,045,870, and consisted principally of barley, beans, potatoes, vegetables, sheep, canned goods, and general merchandise.

COMPARATIVE STATEMENT.

	Short tons	Valuation
1912	50,443	$2,833,704
1913	90,585	5,079,932
1914	69,783	3,045,870

FINANCIAL SUMMARY.

Amount expended on all projects to June 30, 1915:	
New work	$21,402 05
Maintenance	8,743 20
Total	$30,145 25
Amount expended during fiscal year ending June 30, 1913:	
New work	--------
Maintenance	710 00
Amount expended during fiscal year ending June 30, 1914:	
New work	--------
Maintenance	232 40
Amount expended during fiscal year ending June 30, 1915:	
New work	--------
Maintenance	243 20

APPROPRIATIONS.

(For last five fiscal years only.)

February 27, 1911	$5,000 00
March 4, 1913	1,000 00
July 1, 1914, balance unexpended	$1,097 95
June 30, 1915, amount expended during fiscal year, for maintenance of improvement	243 20
July 1, 1915, balance unexpended	$854 75
Amount that can be profitably expended in fiscal year ending June 30, 1917, for maintenance of improvement	[1]$2,500 00

EXAMINATIONS AND SURVEYS MADE IN COMPLIANCE WITH THE RIVER AND HARBOR ACTS OF FEBRUARY 27, 1911, AND MARCH 4, 1913.

Reports on preliminary examinations and surveys required by the river and harbor acts of February 27, 1911, and March 4, 1913, of the following localities within this district were duly submitted by the district officer. They were reviewed by the Board of Engineers for Rivers and Harbors pursuant to law, and were transmitted to congress and printed in documents as indicated:

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[1] Exclusive of the balance unexpended July 1, 1915.

1. *Preliminary examination and survey of Mokelumne River, Cal., with a view to its improvement from the Galt-New Hope bridge to a point at or near Woodbridge.* Reports dated October 16, 1911, and April 2, 1914, with maps, are printed in House Document No. 1160, Sixty-third Congress, second session. The improvement of the locality by the United States in the manner proposed is not deemed advisable at the present time.

2. *Preliminary examination and plan and estimate of cost of improvement of Feather River, Cal., from its mouth to Marysville, with a view to deepening and straightening the channel and to determining what other improvements are necessary in the interests of navigation, consideration being given to any proposition for cooperation on the part of state or other local interests.* Reports dated October 16 and December 29, 1913, are printed in House Document No. 1460, Sixty-third Congress, third session. The improvement of the locality by the United States in the manner proposed is not deemed advisable at the present time, except in so far as already authorized.

The local officer was also charged with the duty of making other preliminary examinations and surveys provided for by the river and harbor acts of February 27, 1911, and March 4, 1915, as follows, and reports thereon will be duly submitted when received:

1. *San Joaquin River, Cal.*, with a view to its improvement up to a point at or near Herndon by means of locks and dams or otherwise.
2. *Sacramento River, Cal., from Chico Landing to Red Bluff.*

REPORT OF SACRAMENTO-FEATHER RIVERS BOARD.

IMPROVEMENTS.

	Page
1. Sacramento and Feather Rivers, Cal. (general improvement)	3345

For description of improvements under this board, see pages 1457 to 1461.

1. Sacramento and Feather Rivers, Cal.

Removal of Obstructions. The Sacramento River was cleared of snags, logs, stumps, and overhanging trees from its mouth to Chico Landing (201 miles). These operations were carried on by the snag boat *Seizer* with a crew of about 32 men. The following is a detailed statement of the obstructions removed in the different portions of the river by the snag boat and crew during the year:

Sections of river	Distance, miles	Logs, trees, stumps and snags blasted or removed from river channel	Overhanging trees and stumps cut from banks	Days operated
Mouth of river to Sacramento	60	43	15	5
Sacramento to Colusa	90	373	69	31
Colusa to Chico Landing	51	1,472	407	120
Totals	201	1,888	491	156

The total field cost of removing these obstructions was $17,561.69.

Wing Dams. Three new wing dams were built on the Sacramento River; one, of a purely temporary nature, 264 feet long, was built about a mile below Chico Landing by the crew of the snag boat *Seizer*, at a cost of $1,525.50; two more of a more permanent nature were built just below Sacramento, one at Sacramento Bend, and one at Merkeleys. These latter were built by hired labor, with government plant, at a cost of $2,100. They were 150 and 200 feet long, respectively.

One wing dam, 105 feet long, was built in the Feather River just above its mouth. This wing dam, however, was built to aid navigation in the Sacramento River by diverting the waters of the Feather River to give a better channel at the confluence of the two rivers. This wing dam was also built by hired labor, with government plant, and at a cost of $1,050. Seventeen wing dams between the mouth of the Feather River and Freeport were repaired at a cost of $4,181.88.

Dredging. Dredging of shoals was resorted to in two places on the Sacramento River at Sacramento Bend below Sacramento and opposite Knox's lumber wharf, a channel 125 feet wide and 600 feet long was dredged to a depth of nine feet, at a cost of $519.87. The dredging was done by a dredge hired at the rate of $135 per day of 22 hours.

Bank Protection Work. A bank protective group of piling about 1,000 feet long, containing 170 piles, was driven at Collins Eddy, Sacramento River. This work was done by hired labor, with government plant, and at a cost of $2,144.44.

Surveys. Surveys of various shoals in Sacramento River were made during July and August, while the river was approaching the low-water stage. These surveys were made to locate accurately the shoals, their extent, and to determine in ample time whether wing dams or dredging would be necessary to maintain the project depths. In some cases surveys were made to determine the effect of the wing dams put in during the previous year. In this way portions of the river were covered by surveys made at the mouth of the Feather River, at Russian Crossing, at Merkeley's Landing, from the mouth of the American to Freeport and at Ida Island. The cost of these surveys and the platting was $952.01.

APPROPRIATIONS.

Previous projects, acts of Mar. 3, 1875, to Aug. 18, 1894, inclusive (see House Document No. 421, 57th Congress, second session, p. 237)		$760,000 00
Present project, act of—		
Mar. 3, 1899	$30,000 00	
June 6, 1900	60,000 00	
June 13, 1902	25,000 00	
April 28, 1904 (allotted May 23 and 31, 1904)	22,000 00	
Mar. 2, 1907	50,000 00	
Mar. 3, 1909 (allotted April 9, 1909)	25,000 00	
June 25, 1910	30,000 00	
Feb. 27, 1911	25,000 00	
July 25, 1912	65,000 00	
Mar. 4, 1913	40,000 00	
Mar. 4, 1915 (allotted April 2, 1915)	60,000 00	
		432,000 00
Total appropriations		$1,192,000 00
Receipts from sales		1,942 07
Total		$1,193,942 07

COMMERCIAL STATISTICS.

The freight and passenger traffic on the Sacramento River is handled by craft which operate on this stream exclusively, and by craft which operate part of the time on other streams (*i e.*, San Joaquin and Mokelumne rivers), as follows:

VESSEL CLASSIFICATIONS.

Class	Number	Net registered tonnage	Passengers
Registered—			
Steamers	41	18,780	139,816
Gas	49	1,421	34,410
Sailing	37	2,193	----------
Unrigged	45	12,004	----------
Unregistered—			
Steamers	----------	----------	----------
Gas	22	----------	1,259
Sailing	3	----------	----------
Unrigged	13	----------	----------
Totals	210	34,407	175,485

FREIGHT TRAFFIC.

Article	Amount		Valuation	Tonnage for which rates and distances are known	Average haul or distance freight was carried (miles)	Rate per ton-mile
	Customary units	Short tons				
Coal	3,833 tons	3,833	$30,664 00	442	52.7	$0.040
Fuel oil	535,480 barrels	91,032	427,850 40	14,211	53.5	.016
Gasoline	3,970 drums	1,707	78,522 00	205	122.4	.034
Distillate	7,340 drums	3,377	96,244 50	412	72.2	.060
Coal oil	21,630 cases	887	22,175 00	21	100.4	.046
Lubricating oil	----------	151	9,815 00	10	22	.091
Machinery	139 tons	139	20,850 00	133	18.5	.167
Autos	2,147	3,221	2,254,700 00	51	122.7	.057
Wagons	976	976	73,200 00	124	96.8	.097
Buggies	1,000	300	42,000 00	25	150	.033
Sand	52,945 cubic yds.	79,417	52,944 67	50,245	61.3	.013
Gravel	1,593 cubic yds.	2,390	1,593 33	2,390	69.7	.017
Brick	11,976,000	29,930	89,820 00	32	31.1	.099
Cement	24,610 barrels	4,676	46,760 00	3,437	52.3	.045
Crushed rock	2,920 cubic yds.	4,380	4,380 00	----------	----------	----------
Lumber	33,700 M feet	50,549	505,490 00	3,668	110.5	.046
Piles	11,610	8,707	58,046 60	1,240	119	.013
Shingles	41,573,000	3,118	62,360 00	19	65	.023
Shooks	2,460 M feet	2,460	67,650 00	----------	----------	----------
Cordwood	3,421 cords	6,842	17,105 00	3,070	40	.046
Wheat	14,102 tons	14,102	943,570 00	6,981	100.7	.015
Barley	63,745 tons	63,745	1,466,135 00	13,010	114.5	.015
Oats	691 tons	691	20,730 00	210	91.4	.023
Corn	23 tons	23	805 00	----------	----------	----------
Flour	8,010 barrels	801	56,070 00	429	132.5	.017
Millstuff	224 tons	224	6,720 00	224	97.8	.020
Rice	5,065 tons	5,065	405,200 00	204	98.3	.022
Beans	23,348 tons	23,348	1,634,360 00	373	39.3	.103
Potatoes	20,329 tons	20,329	406,580 00	4,028	68.7	.020
Onions	1,582 tons	1,582	15,820 00	----------	----------	----------
Asparagus	12,001 tons	12,001	600,050 00	4,226	8	.204
Other vegetables	19,909 tons	19,909	995,450 00	2,056	72.7	.030
Hay	30,371 tons	30,371	242,968 00	17,581	75.7	.028
Wool	510 tons	510	183,600 00	25	150	.033
Hides	2,240 bundles	325	162,500 00	----------	----------	----------
Horses	1,575 head	945	236,250 00	256	38.7	.061
Cattle	2,030 head	710	99,400 00	158	28.9	.024
Sheep	34,224 head	2,139	256,680 00	1,227	65.5	.029
Hogs	13,870 head	1,040	187,200 00	86	69.9	.108
Fruit, fresh	14,109 tons	14,109	987,630 00	3,087	48.8	.057
Fruit, dried	3,591 tons	3,591	538,650 00	295	148.3	.020
Grapes	57 tons	57	1,425 00	57	45	.055
General merchandise	157,954 tons	157,954	19,744,250 00	20,520	126.4	.021
Canned goods	760,600 cases	22,819	2,738,280 00	59	22	.091
Wine	194,500 gallons	940	47,000 00	----------	----------	----------
Meats	84 tons	84	20,160 00	28	10.7	.418
Fish	2,189 tons	2,189	262,680 00	----------	----------	----------
Dairy produce	1,164 tons	1,164	232,800 00	193	20	.100
Eggs	1,210 cases	34	10,200 00	1	20	.100
Sugar	2,309 tons	2,309	230,900 00	----------	----------	----------
Hops	261 tons	261	114,840 00	----------	----------	----------
Paper	1,487 tons	1,487	148,700 00	----------	----------	----------
Miscellaneous	16,689 tons	16,689	1,668,900 00	321	180	.036
Asphalt	9,425 barrels	1,366	10,586 50	1,366	96	.013
Poultry	----------	75	22,500 00	56	20	.100
Totals	----------	721,090	$38,211,760 00			

Note.—Attention is invited to the fact that, in general, rates and distances carried are known for short hauls of small lots only, and the rates per ton-mile are therefore necessarily large.

During the spring (1915) a new line of boats began operating upon the Sacramento River. Two gas schooners make a daily trip from San Francisco to Courtland and return, hauling fruit, vegetables and other freight.

Through the Northern Electric Railway drawbridge at M street, Sacramento, 3,054 steamboats, 1,005 barges, 969 gas boats, 73 sailing vessels, 30 dredges and 29 pile drivers passed during the year.

Through the Southern Pacific Railway drawbridge at H street, Sacramento, 895 steamboats, 799 barges, 867 gas boats, 31 sailboats, 27 dredges and 20 pile drivers passed during the year. (Between M and H streets, Sacramento, the project depth changes from seven feet to four feet.)

Through the Southern Pacific Railway drawbridge at Knights Landing, 563 steamboats, 408 barges, 321 gas boats, six sailboats, 8 dredges and seven pile drivers passed during the year.

Through the Northern Electric Railway drawbridge at Meridian 424 steamers, 196 barges, 15 gas boats, two sailboats and nine dredges passed during the year.

In the above only those passages for which draw operation was required are tabulated.

IMPROVEMENT OF RIVERS AND HARBORS IN THE THIRD SAN FRANCISCO, CAL., DISTRICT.

Report of Major L. H. Rand, Corps of Engineers.

IMPROVEMENTS.

Page
1. San Joaquin River, Cal. 3349
2. Stockton and Mormon channels (diverting canal), Cal. 3353
3. Mokelumne River, Cal. 3353

For description of improvements in this district, see pages 1461 to 1473.

1. San Joaquin River, California.

(A) *San Joaquin River, Including Stockton and Mormon Channels, Nine-foot Channel, Maintenance.*

Contract was entered into July 17, 1914, with Standard American Dredging Company for dredging shoals in Stockton Channel at ten cents per cubic yard and in the San Joaquin River, below its junction with the latter, at nine and nine-tenths cents per cubic yard. (See annual report, 1914, part III, p. 3172.) Operations under this continued from October 1, 1914, to January 8, 1915.

In Stockton Channel, from its junction with Mormon Channel to a point 3,700 feet below, 85,761 cubic yards of material were removed at a price of $8,576.10. Dredging was paid for to a depth of ten feet below mean low water (one foot overdepth), width of bottom 100 feet, and side slopes one and five-tenths feet. The contractor removed material in excess of the required section, in places to a depth of 20 feet below mean low water, in order to use the material for fill on adjacent grounds.

In the San Joaquin River two shoals were dredged, one extending between points 1,600 and 2,500 feet below its junction with Stockton Channel, the other between points 5,000 and 7,000 feet below the junction. A total of 58,974 cubic yards of material was removed at a price of $5,858.43. The section paid for was the same as that in Stockton Channel except that the width was increased at approaches to bends to conform to the natural alignment of river bed.

From the total contract price of $14,414.50, the sum of $39.60 was deducted to cover cost of inspection after time limit.

Administrative charges have brought the total expenditure for fiscal year to $17,331.69.

The material dredged varied from sand to hard clay. It was pumped ashore by the 15-inch suction dredge *Wilmington*, the length of pipe-line varying from 365 to 4,770 feet, average being 2,480 feet.

(B) San Joaquin River, Nine-foot Channel and Cut-offs.

Leases were entered into September 26, 1914, and renewed January 11, 1915, with American Dredging Company for use of the clamshell dredge *Uncle Sam* with an auxiliary plant, for $175 per day of 22 actual working hours, for excavation of cut-off "C," described in House Document No. 1124, Sixtieth Congress, second session.

The dredge operated from October 10, 1914, to February 11, 1915, the estimated amount due the lessor being $19,360.09. In addition to this sum ($19,360), the contractor has presented claim for payment of an additional amount. This claim has been referred to the auditor and final settlement not yet effected. The quantity of material estimated to be removed was 350,000 cubic yards. A survey made in April shows that there has been a total of 320,000 cubic yards removed, leaving 30,000 cubic yards to be removed to complete cut-off.

The banks slipped badly, necessitating rehandling. It was estimated from the operation of dredge that material about 40 per cent in excess of above quantity was handled. The material was sand, loam, peat, and hardpan. The cost per yard on the basis of material actually handled is four and one-tenth cents per cubic yard; on basis of material removed from prism, six cents per cubic yard.

The prism of cut-off as it now exists has the required depth except at one point, where the weight of spoil bank forced into the cut soft underlying material from a previous river channel which it crossed. Additional work is required to bring the cut to full width and regular alignment, especially at the point just referred to and at the upper end of the cut-off, where the levee on one side was not cut because of flood conditions at the time. The cut-off is now used by all the river traffic. Administrative expenses have increased the total expenditures during fiscal year to $20,411.02.

(C) San Joaquin River, Fremont Channel and McLeod Lake, Arms of Stockton Harbor.

The approved depths of McLeod Lake and Fremont Channel, which are included in Stockton Harbor project, are believed to exist unimpaired, although no survey of the area has been made; no maintenance work has been required.

APPROPRIATIONS.

Date of rivers and harbors act	Maintenance	9-foot channel and cut-offs	Fremont Channel and McLeod Lake, arms of Stockton Harbor		Total
			Improvement	Maintenance	
Aug. 14, 1876	$20,000 00				$20,000 00
June 14, 1880	20,000 00				20,000 00
March 3, 1881	40,000 00				40,000 00
Aug. 2, 1882	40,000 00				40,000 00
July 5, 1884	20,000 00				20,000 00
Aug. 5, 1886	18,750 00				18,750 00
Aug. 11, 1888	25,000 00				25,000 00
Sept. 19, 1890	75,000 00				75,000 00
July 13, 1892	65,000 00				65,000 00
Aug. 18, 1894	50,000 00				50,000 00
June 3, 1895	57,750 00				57,750 00
March 3, 1899	20,000 00				20,000 00
June 13, 1902	18,000 00				18,000 00
April 28, 1904	[1]35,170 00				35,170 00
March 3, 1905	20,000 00				20,000 00
March 2, 1907	30,000 00				30,000 00
March 3, 1909	[2]20,000 00				20,000 00
June 25, 1910	35,000 00	$40,000 00			75,000 00
Feb. 27, 1911	25,000 00				25,000 00
July 25, 1912	40,000 00		$11,000 00		51,000 00
March 4, 1913		159,632 00			159,632 00
March 4, 1913	[3]25,000 00			[3]$500 00	[3]25,500 00
		$199,632 00			$910,802 00
Withdrawn under act of Mar. 4, 1915		30,000 00			30,000 00
Net totals	$699,670 00	$169,632 00	$11,000 00	$500 00	$880,802 00
Treasury settlements, Oct. 11, 1911	11 25				11 25
Grand totals	$699,681 25	$169,632 00	$11,000 00	$500 00	$880,813 25

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[1] Allotted May 31, 1904.

[2] Allotted April 10, 1909.

[3] Apportioned by War Department from $26,500 appropriation which provides for three separate projects in lump sum.

Contracts in Force.

(*a*) *Dredging in San Joaquin River and Stockton Channel, Cal.*
Name of contractor: Standard American Dredging Company.
Date of contract: July 17, 1914.
Date of approval: August 8, 1914.
Date fixed for commencement: September 10, 1914.
Actual date of commencement: October 3, 1914.
Date fixed for completion: December 9, 1914.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $11,146.
Prices, per unit: 9.9 cents per cubic yard, 10 cents per cubic yard.

(*b*) *Lease for dredge to be used in making cut-off "C" in San Joaquin River, Cal.*
Name of contractor: American Dredging Company.
Date of contract: September 26, 1914.
Date of approval: Lease, approval not required.
Date fixed for commencement: October 6, 1914.
Actual date of commencement: October 6, 1914.
Date fixed for completion: January 21, 1915.
Percentage of completion at end of fiscal year: 100.
Amount of contract: $16,055.56.
Price, per unit: $175 per day.

(*c*) *Lease for dredge to be used in making cut-off "C" in San Joaquin River, Cal.*
Name of contractor: American Dredging Company.
Date of contract: January 11, 1915.
Date of approval: Lease, approval not required.
Date fixed for commencement: January 22, 1915.
Actual date of commencement: January 22, 1915.
Date fixed for completion: February 28, 1915.
Percentage of completion at end of fiscal year: 100.[1]
Amount of contract: $5,600 as made; $1,952.83 allowed for work.
Price, per unit: $175 per day.

COMMERCIAL STATISTICS.

Vessel Classification.

Class	Number	Net registered tonnage	Passengers
Registered—			
Steamers	22	7,373	72,313
Gas	64	1,030	110,343
Sailing	28	1,509	
Unrigged	39	6,033	
Unregistered—			
Gas	13		7,011
Sailing	5		
Unrigged	21		
Totals	192	15,945	189,667

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[1] Not in strict accordance with contract terms.

FREIGHT TRAFFIC.

Article	Amount		Valuation	Tonnage for which rates and distances are known	Average haul or distance freight was carried (miles)	Rate per ton-mile
	Customary units	Short tons				
Coal	1,702 tons	1,702	$13,616 00	1,526	82.5	$0.020
Fuel oil	435,660 barrels	70,492	331,312 40	16,337	74.2	.014
Gasoline	27,531 drums	11,816	543,536 00	----------	----------	----------
Distillate	16,747 drums	7,700	219,450 00	30	40	.037
Coal oil	9,638 cases	395	9,875 00	----------	----------	----------
Lubricating oil	----------	60	3,900 00	----------	----------	----------
Machinery	2,503 tons	2,503	375,450 00	----------	----------	----------
Autos	106	159	111,300 00	----------	----------	----------
Wagons	310	310	23,250 00	164	62.5	.048
Buggies	108	32	4,480 00	----------	----------	----------
Sand	21,237 cubic yds.	31,855	21,236 60	31,605	72.7	.008
Brick	4,280 M	10,699	32,097 00	10,691	49.8	.020
Cement	115 barrels	23	230 00	23	22.6	.072
Crushed rock	11,083 cubic yds.	2,525	2,525 00	2,525	34	.009
Lumber	17,317 M feet	25,976	259,760 00	12,021	83.2	.018
Piles	1,420	1,065	7,100 00	----------	----------	----------
Shingles	280 M	21	420 00	16	45	.010
Shooks	610 M feet	610	16,775 00	10	80	.012
Cordwood	3,199 cords	6,398	15,995 00	6,398	61.3	.028
Wheat	23,381 tons	23,381	818,335 00	586	58.6	.040
Barley	107,544 tons	107,544	2,473,512 00	82,937	80.8	.015
Oats	2,221 tons	2,221	66,630 00	1,715	61	.025
Corn	1,487 tons	1,487	52,045 00	828	44	.025
Flour	7,160 barrels	716	50,120 00	357	89.8	.011
Millstuff[1]	54,972 tons	54,972	2,748,600 00	3,267	75	.027
Rice	32 tons	32	2,560 00	10	15	.200
Beans	27,218 tons	27,218	1,905,260 00	8,541	74.7	.014
Potatoes	144,155 tons	144,155	2,883,100 00	95,022	55.8	.020
Onions	28,785 tons	28,785	287,850 00	23,896	62.5	.016
Asparagus	4,188 tons	4,188	209,400 00	3,542	15.1	.171
Other vegetables	26,321 tons	26,321	1,316,050 00	812	38.4	.043
Hay	12,542 tons	12,542	100,336 00	10,095	81.8	.024
Wool	5 tons	5	1,800 00	----------	----------	----------
Hides	160 bundles	72	36,000 00	----------	----------	----------
Horses	1,768 head	1,060	265,000 00	876	51.1	.072
Cattle	1,985 head	695	97,300 00	525	26.7	.107
Sheep	68,576 head	4,286	514,320 00	4,261	28.5	.033
Hogs	440 head	33	5,940 00	29	35.5	.108
Live stock	----------	777	116,550 00	----------	----------	----------
Salt	20 tons	20	300 00	20	115	.017
Fruit, fresh	226 tons	226	15,820 00	----------	----------	----------
Fruit, dried	2 tons	2	300 00	----------	----------	----------
General merchandise	152,031 tons	152,031	19,003,875 00	7,212	73.7	.027
Canned goods	57,400 cases	1,722	206,640 00	3	20.3	.137
Hemp	345 bales	50	5,000 00	----------	----------	----------
Beet pulp	450 tons	450	1,350 00	----------	----------	----------
Soda water	3,392 cases	212	11,660 00	----------	----------	----------
Beer	17,824 cases	1,114	66,840 00	----------	----------	----------
Meats	115 tons	115	27,600 00	1	25	.080
Fish	582 tons	582	69,840 00	317	79.8	.019
Dairy produce	474 tons	474	94,800 00	----------	----------	----------
Miscellaneous	327 tons	327	32,700 00	31	24.6	.091
Totals		722,156	$35,479,741 00			

[1] Includes much flour.

Note.—Attention is invited to the fact that, in general, rates and distances carried are known for short hauls of small lots only and the rates per ton-mile are therefore necessarily large.

2. Stockton and Mormon Channels (Diverting Canal), Cal.

During July $250 was expended, by oral agreement for a particular piece of work, in clearing the canal of undergrowth. Administrative charges have increased the total spent during the fiscal year to $334.26.

APPROPRIATIONS.

Date of river and harbor act	Improvement	Maintenance	Total
June 13, 1902	$50,000 00		$50,000 00
March 3, 1903	[illegible]		70,000 00
April 28, 1904	75,000 00		75,000 00
March 3, 1905	49,216 00		[illegible]
March 4, 1909	[illegible]		[illegible]
March 4, 1913		[1]$1,000 00	1,000 00
Totals	$280,895 00	$1,000 00	$281,895 00
Received by treasury settlements October 11, 1911			8 33
Grand total			$281,903 33

Contracts in Force.

There were no contracts in force during the year.

Commercial Statistics.

See "Commercial Statistics" for San Joaquin, Cal., page 3352.

3. Mokelumne River, Cal.

There was no work done on this stream during the year. Of the total amount expended, $243.20, the sum of $43.20 was to cover outstanding liabilities from preceding year, and $200 was for administration.

APPROPRIATIONS.

Improving Mokelumne River, California.

River and Harbor acts of	
July 5, 1884	$6,500
Aug. 5, 1886	2,500
Aug. 11, 1888	2,000
July 13, 1892	[illegible]
Aug. 18, 1894	[illegible]
Mar. 3, 1905	[illegible]
Mar. 2, 1907	[illegible]
June 25, 1910	2,000
Feb. 27, 1911	[illegible]
Mar. 4, 1913	1,000
Total	$21,000

Contracts in Force.

There were no contracts in force during the year.

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[1] Allotted from $26,500 appropriation of March 4, 1913, which provided for three projects in lump sum.

COMMERCIAL STATISTICS.

Vessel Classifications.

Class	Number	Net registered tonnage	Passengers
Registered:			
Steamers	7	2,185	1,326
Gas	28	345	
Sailing	5	217	
Unrigged	16	1,720	
Unregistered:			
Steamers			
Gas	5		668
Sailing	3		
Unrigged	8		
Total	72	4,467	1,994

NOTE.—Through the Southern Pacific Railway bridge over Snodgrass Slough, a tributary of the Mokelumne River, 60 gas boats, 2 sailing vessels, 46 barges and 6 dredges passed during the year.

FREIGHT TRAFFIC.

Article	Amount		Valuation	Tonnage for which rates and distances are known	Average haul or distance freight was carried (miles)	Rate per ton-mile
	Customary units	Short tons				
Coal	40	40	$720 00	40	90.0	$0.016
Fuel oil	8,035 barrels	1,306	6,420 00	767	57.6	.018
Gasoline	77 drums	33	1,518 00			
Distillate	790 drums	363	10,345 50	12	40.0	.038
Coal oil	537 cases	22	550 00			
Lubricating oil		15	975 00			
Machinery		119	17,850 00	7	15.0	.133
Wagons	40	40	3,000 00	37	50.0	.120
Buggies	3	1	140 00			
Brick	2 M	5	15 00	5	50.0	.040
Lumber	945 M	1,412	14,120 00	251	49.8	.035
Shingles	53 M	4	80 00	4	40.0	.043
Shooks	5 M feet	5	137 50			
Cordwood	110 cords	220	550 00	220	24.5	.036
Wheat	10 tons	10	350 00			
Barley	6,778 tons	6,778	155,894 00	3,702	59.1	.019
Millstuff[1]	138 tons	138	6,900 00	138	50.0	.040
Beans	3,768 tons	3,768	263,760 00	737	48.6	.021
Potatoes	37,451 tons	37,451	749,020 00	10,340	34.8	.036
Onions	87 tons	87	870 00	87	50.0	.024
Asparagus	421 tons	421	21,050 00			
Other vegetables	4,486 tons	4,486	224,300 00	769	49.7	.047
Hay	640 tons	640	5.120 00	365	35.9	.060
Horses	345 head	207	51,750 00	97	43.5	.084
Cattle	6 head	2	280 00			
Sheep	15,000 head	900	112,800 00			
Fruit, fresh	124	124	8,680 00			
Grapes	66 tons	6	1,650 00	66	45.0	.056
General merchandise	8,493 tons	8,493	1,061,625 00	445	47.8	.042
Canned goods	50,000 cases	1,507	180,840 00			
Fish	318 tons	318	38,160 00	158	65.0	.023
Dairy produce	462 tons	462	92,400 00			
Beer	3,840 cases	240	14,400 00			
Totals		69,723	$3,045,870 00			

[1] Includes flour.

NOTE.—Attention is invited to the fact that, in general, rates and distances carried are known for the short hauls of small lots only and the rates per ton-mile are therefore necessarily large.

RIVER WORK.

All matters of drainage, improving and rectifying river channels and other work on any river or slough connecting with San Francisco Bay, San Pablo Bay, and Suisun Bay, and the tidewaters flowing in said bays wherein state moneys are expended, are placed under the management of the Department of Engineering. The department has charge of all expenditures, unless otherwise specially provided by law, for all public works relating to general river and harbor improvements, reclamation and drainage of lands, purchase, construction and operation of dredges and other appliances and including the acquisition by purchase, condemnation or otherwise of rights of way for any of said purposes.

Whenever work in the interests of navigation and the control and maintenance of stable conditions of the rivers involves also direct benefits or protection to the lands seeking to have the work done by the state the lands so benefited are required to bear a portion of the cost of the work, usually one-half to two-thirds, the state paying the remaining portion.

Owing to the fact that the climate of the Great Valley is passing through a "dry" cycle, no great floods have occurred in either stream system for several years. Not since 1911 has the San Joaquin experienced a flood, and 1909 was the last high water in the Sacramento which reached dangerous conditions.

As a consequence of several years immunity from floods, there have been no crevasses formed requiring closures or extensive protection works.

Long-continued low plane of the water surface, however, is conducive to active caving of the alluvial banks, and in places this has occurred to the great loss of good land and destruction of levees, creating conditions where serious breaches would likely occur at the next flood. The department has kept close watch of such conditions, and wherever danger threatened has applied remedial measures.

The principal work of the river improvement division since the last report has been to repair and maintain revetment previously laid, and to place new revetment where conditions demanded.

Several types of bank protection have been used by the state and by private reclamation projects. Formerly where current or wave action attacked a levee the slope was protected by covering it with brush held down with poles laid transversely and tied with wire to stakes driven into the soil.

Jetties of brush and posts or piles have been extensively used. A patented cellular jetty was introduced five or six years ago which its advocates thought would always deflect the current from the bank with sure benefit. In practice it was found to succeed in some places, but absolutely failed to accomplish its purpose in others.

Many miles of brush bulkhead along the foot of the banks have been constructed, some successfully performing their functions and others failing. Plank bulkheads on piles, sheet piles and other devices have been used, but all structures of wood are perishable and of short duration. Attempts have been made to use concrete in various ways. Several miles of levee have been covered on the slope with concrete pavement. Usually this is two to three inches thick, laid on as a continuous sheet, frequently having light steel reinforcement. Sometimes expansion joints are introduced and other times the slab is continuous for long distances.

The state experimented with a concrete covering laid in separate blocks 13 x 60 inches and 3 inches thick. The blocks were manufactured in a plant and brought to the bank, where they were laid on the slope and strung together with cables anchored into the top of the levee. The theory of the inventor was that being fastened to cables the "mattress" would have great flexibility and should undercutting occur the "mat" would accommodate itself to the unevenness of the slope and continue to protect it from current action.

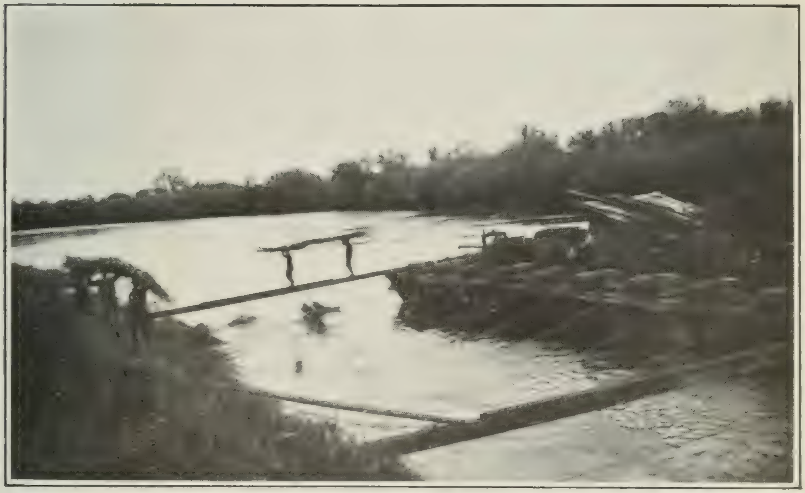
In practice it was found that if undercutting occurred at all, the earth would slide underneath the concrete, leaving holes, and while the flexibility did allow the mat to settle to some extent, it was not sufficient to follow extensive subsidences, and consequently the blocks would break or pull apart, leaving holes through which the water would attack the earth slope. Generally, if no undercutting took place the revetment stood well and thoroughly protected the bank, and in that used by the state a portion was provided with a sheet-piling toe wall which, protecting the bank slope from undercutting, has rendered the flexible mattress very effective. But this is accomplished by a condition where flexibility is not required, hence a solid sheet of concrete covering the slope would be just as effective and would cost much less than the other.

The question of bank protection is one that engages serious thought and the Department of Engineering has given much study to the subject and some experiment with a view of determining a method that will be effective and yet the cost of which will not be prohibitive.

The causes which lead to the disintegration of the river banks are current action and wave action. The current usually attacks the foot of the bank, eroding the earth, and causing the overhanging material above the erosion to break off and fall into the stream. This condition is aggravated by the overload from levees being placed in the bank as close as possible to the edge. Erosion once started soon reaches the

PLATE XIII.

Bank Protection—Unloading brush for a mattress.



Bank Protection—Beginning a brush mattress.

(p. 100)

line of the levee when both bank and levee quickly fall in, creating a breach which in high water becomes a crevasse. Wave action, induced by wind or the swell of passing water craft, attacks the bank at the water's edge. The waves being driven against the bank or up the slope of a levee, displace portions of the earth surface. Having once started disintegration, every wave increases the displacement. The material falls into the water, and the final result is the same as that of current erosion, the destruction of the bank at the point of attack.

Along the river channels the width of water surface is seldom sufficient for waves raised by the wind to acquire sufficient impetus to have much effect on the banks, but in the confined space of a channel the waves caused by a steamer make great havoc.

Current erosion is generally confined to the convex side of bends, but the waves from water craft attack the entire length of both banks. Furthermore, their effect is felt at every stage of the water surface, and in such streams as the Sacramento River, where the range from low- to high-water stages is nearly 30 feet, there is presented a width of 60 to 100 feet, depending upon the slope, every part of which is subject to attack and injury from the waves, and it is only where the material is particularly firm or is protected by vegetable growth that it does not yield to the constant pounding of the waves.

This condition is becoming more pronounced every year. The rapid increase in the number of river craft increases the frequency of the waves and the increase in size and speed of the boats enlarges the swell and thus augments the destructive effects.

It is no stretch of the imagination to believe that in a few years the increase of commerce on the inland waterways carried in more numerous, larger and swifter craft will create conditions requiring some kind of protection to the entire length of both banks of the Sacramento below the city and probably much of the river above.

Owing to the broader expanse of water in the lower San Joaquin, the above-described conditions do not obtain in the same degree. Wave action from winds is more pronounced, but the nature of the material of the banks enables them to withstand the pounding, and the narrow range between low-water and flood planes modify greatly the cost of maintenance.

The cheapest and at the same time most effective bank protection yet tried by the department is a type of flexible brush mattress woven of willow brush fascines and wire cables, anchored into the bank and weighted down with attached concrete or stone weights.

The woven brush mattress has long been used by the government for protecting the banks of the Mississippi, Missouri and other large streams, but the system used by the Department of Engineering differs from the government method in having the weights attached to the mattress instead of deposited loosely on its surface. Formerly the state placed considerable quantities of the rock-laden type, but in many cases erosion took place at the edge of the mattress, causing it to sink lower. The slope then being increased the rocks rolled off, the brush floated in the water, was torn loose from its mooring and carried away.

By attaching the weights to the cables woven in the mattress and fastened in the bank, the whole remains in place even though erosion should take place to such an extent as to hang the mattress like a curtain over the bank.

An advantage of this kind of work is that it can be extended far into the stream, covering the bed beyond any probable chance of erosion starting under the edge.

A disadvantage of this type is that, being made of brush, the durability of the material is limited. Where it is constantly submerged it will last a long time, but above permanent water surface the wood decays and in a few years must be renewed. In many situations, however, when the brush is cut late in the fall, and after being laid is covered with a few inches of earth or sand the brush will sprout and grow into a dense thicket of fine brush affording a living and permanent protection. It frequently happens, though, that the brush sprouts will die unless irrigated during the first summer.

Several of the mattresses laid by the department have been treated as indicated above, and now present an impregnable defense to the onslaughts of the water. When the brush fails to grow, the same effect is obtained by driving down green willow stakes at close intervals over the mattress.

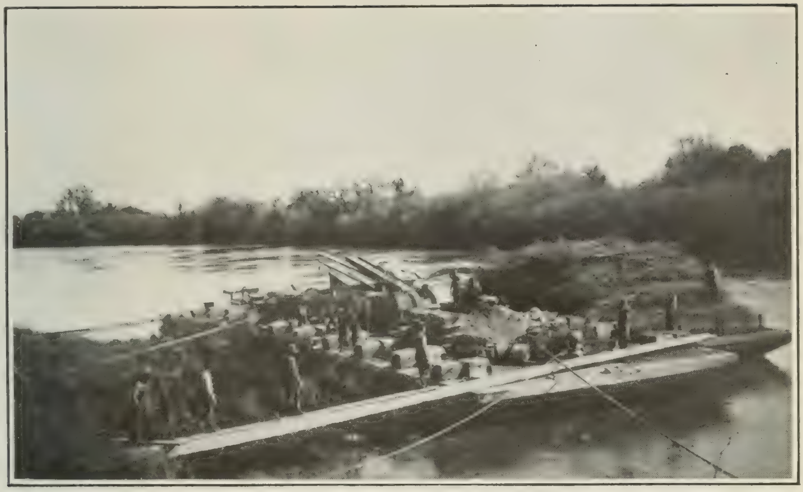
A description of the river work executed during the two years just passed, follows:

SACRAMENTO RIVER.

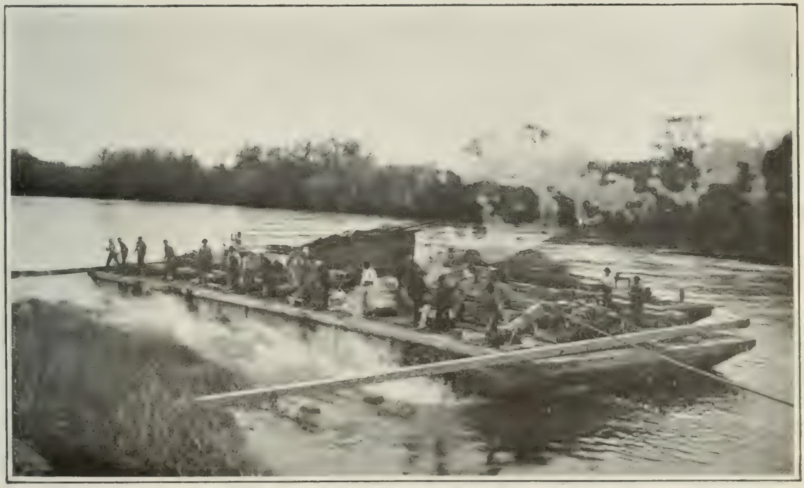
Crouch Landing. This point, known also as Bower's Ranch, continues to give concern to the landowners adjacent. Erosion of the bank around a sharp bend of the river has moved that bank several hundred feet inland, washing away many acres of valuable land.

Several attempts have been made to arrest the erosion, but owing to a combination of circumstances—a high bank of friable earth underlaid by a stratum of loose gravel situated in the "whirl" of a strong current—requires treatment that will cost more than the immediate beneficiaries care to incur. Should the erosion extend to a point where danger of a break forming a new channel to the injury of navigation and the destruction of a large area of valuable lands, no doubt cooperation can be effected for constructing adequate protective works.

PLATE XIV.



Bank Protection—Weaving the mat.



Bank Protection—Preparing to launch a mat.

The only work attempted since the last report was trimming the bank for a slope of 1 to 1 for a length of 2,100 feet, grubbing brush and clearing debris from ten acres of river bed, and clearing out a shallow cut-off channel across the chord of the bend.

The cost of this work was $1,908.73, one-half of which was paid by the adjoining landowners.

Meridian. At a bend in the river, beginning about a half mile above the Northern Electric Railroad bridge at Meridian, erosion had attacked the left bank and advanced well into the levee. A breach here would result in great injury to the lands between the river and Butte Slough, damage to the railroad and the power lines crossing the basin, and destruction to the town of Meridian with probable loss of life, in addition to the inevitable injury to navigation which always follows a serious break.

Cooperative arrangements were made with the property interests threatened and two pieces of flexible brush mattress were laid on the stretch threatened, covering 124,000 square feet of bank.

The total cost of the work was $13,739.45, one-third of which was paid from state funds and two-thirds by the property owners.

Collins Eddy. This is a very sharp bend of the river, the stream turning its course 300 degrees in a distance of one-quarter of a mile. The current had washed away the bank and cut into the levee, causing the property owners to move buildings farther away. A breach here would entail great damage to adjacent property and injury to navigation on the river.

The federal engineers approved the proposed work and contributed piles and drove them in place to the extent of about $2,000. Owing to delays in effecting cooperative agreements with the bank owners, work was not commenced until December, 1914. High water caused a suspension of work and when the flood had subsided considerable of the work placed had been washed away. Operations were resumed the next year. In addition to repairing those portions of the previous year's work left standing, a part of that washed out was replaced with the same type of pile and brush bulkhead, but it was found that bulkheads would not stand the impact of barges thrown against them by the whirling current. A brush mattress was then laid on the bank subject to the hard usage, and owing to the violence of the pounding it would receive from passing craft it was made much heavier than usual, being woven with a thickness of three feet at the lower selvage.

The mattress laid measured 420 feet long, average 70 feet wide, aggregated 29,400 square feet and contained 373 cords of brush.

The previous year's work had taken all of the brush in the immediate vicinity so that used for this work was obtained at Knights Landing and transported more than twenty miles by barge to the work.

The total cost of both years work was $8,241.17, which was borne equally by the state and the property owners. These figures do not include about $2,000 contributed in piling by the government in December, 1914.

Edwards Break. This name is applied to the vicinity of a crevasse which occurred in the left bank of the river opposite Sutterville a short distance below the corporate limits of the city of Sacramento. The break occurred during the flood of 1904 and spread devastation throughout the Sacramento basin to the Mokelumne River, causing that stream to overflow its banks and spread its water almost to the city of Stockton. Only by dint of constant effort was the Y street levee maintained as a bulwark against the flood's invasion of the streets of the capital city. It is said to have cost the state more than $100,000 to close the break.

For many years the levees for a distance of more than a mile have been gradually succumbing to attacks of current and wave, and each report of this department has detailed efforts to maintain them in a safe condition. Several stretches of brush mattress have been laid from time to time to hold the most dangerous places.

Reclamation District No. 535, in 1914 proposed a plan of permanent improvement to consist of covering the slope of the bank next the river with a concrete cover laid in sections fastened together with cables so as to give (as the patentee thought) a degree of flexibility to the covering which would enable it to adapt itself to inequalities of the slope in case of settlement of the soil underneath.

The work executed was not continuous, as any bank that was holding firmly was not covered. The aggregate of the concrete laid was 8,141 lineal feet covering 404,949 square feet.

Owing to the settlement of the earth as work progressed, it was necessary to take up and relay a considerable portion. Also to prevent further settlement a sheet pile toe wall was driven at the toe of portions of the work. This was found very necessary wherever the material of the bank was sandy, or where because of restricted right of way the slope was made steeper than 1½ to 1.

The total cost, including toe walls and relaying of damaged work, was $86,451.34, amounting to $0.213 per square foot.

Freeport. Conditions at Freeport have given the authorities much concern. A length of about 6,000 feet of the left bank in a long bend is affected. The levee is high and composed largely of sandy materials. The land adjacent is low and should a break occur the flood would flow across the intervening country to the Mokelumne River and, should that stream be full at the time, its channel would be gorged and break over to the south, inundating the territory toward Stockton, as occurred at the time of the Edwards break, detailed above.

PLATE XV.

"Let 'er go!" Launching a completed mat.

Bank Protection—Finishing a job.

The property immediately back of the levee is not in a reclamation district and it has been impossible to enlist cooperative action.

The department in cooperation with the county of Sacramento in 1914 placed some revetment in the worst places, but owing to lack of funds it was mostly of a temporary character.

Each year since, this department has continued to maintain the levee against the encroachment of the current, but always with works of a temporary character, the only cooperative funds available being $1,000 from the county.

In January, 1916, conditions were so bad that it was necessary to lay 2,060 lineal feet of standard brush mattress.

The expenditures at this place during the biennium just closing have been as follows:

March and April, 1915	$2,031 54	
December, 1915, January, 1916	2,372 21	
		$4,403 75
Of the total cost, the county of Sacramento paid	$1,000 00	
Sacramento and San Joaquin drainage district	186 11	
		1,186 11
The state		$3,217 64

Sherman Island. Most of the work executed for the security of the banks along the shores of this island has required little attention. The work of enlarging the waterway of Sacramento River by cooperation between the government and the state has gone steadily on and its effects are very marked in the reduced amount of damage done to the levees.

Three-mile Slough is a branch of the Sacramento River between Sherman and Brannan islands and connecting the Sacramento and San Joaquin rivers. About half a mile from the head the slough turns abruptly to the left, and the swirling waters have washed out a deep pool which has a tendency to constantly work inland.

Several years ago a bulkhead of piles and brush was constructed here to stop the erosion. The depth of water is more than fifty feet and the bottom is hardpan so that piles can not be driven with sufficient penetration to make them secure. Owing to the swift and whirling current, passing steamers and barges are sometimes thrown against the bulkhead with great force, breaking the piles or loosening them. For this reason annual repairs are necessary. During the last two years repairs have been made in cooperation with the trustees of Reclamation District No. 341, costing $2,614.37, of which the district has paid one-half.

SAN JOAQUIN RIVER.

Until investigations now being made by the state and federal agencies shall be completed and a plan formulated for flood control in the interests of navigation and reclamation, it has been considered inexpedient for the Department of Engineering to do more than to endeavor to maintain conditions as they are and has confined its activities to assisting in the maintenance of levees and installation of bank protection where conditions became dangerous, or where navigation could be permanently benefited.

Smith's Canal. Protection to the bank of the river at the junction of Smith's Canal as projected at the close of the last report was constructed at a cost in excess of $1,200, of which the state contributed $587 and adjoining property owners the remainder.

Rough and Ready Island. The legislature in 1911 appropriated $15,000 for acquiring rights of way to enable the government to make two cut-offs of bends in the San Joaquin. The rights were obtained and the cuts are at this writing very nearly completed.

Stockton Channel. The national government contemplates enlarging and improving the shipway of Stockton Channel, for which rights of way are required.

Reclamation District No. 511. The brush mattress being placed at the time of the last report was completed at an expense of $4,622.88, the state and district each paying half.

Reclamation District No. 17. Several places occur in the banks of the river above the diversion of Old River where the bank and levees are subject to severe strain in times of flood, and which if allowed to break would flood the country to the north almost to Stockton. It requires constant watching to prevent conditions reaching a dangerous stage. By cooperation with the property owners, the banks have been maintained so that no serious breaks have occurred for several years.

An old brush mattress at Caloris ranch was repaired and improved with 110 lineal feet of new mattress, 1,400 lineal feet was laid near the county highway bridge on the Lathrop-Tracy road, and 300 lineal feet at Walthall Slough, aggregating 1,810 lineal feet of revetment amounting to 136,700 square feet at a cost of $12,417.34, one-half being paid by the district.

Paradise Bend. Three units of revetment were placed here during the last biennial period, a forecast of which was made in the last report. The location and extent of the units appear as follows:

Fink's Pump ------	Dimensions	545 x 75 ft., area	40,875 sq. ft.
At Paradise Cut----	Dimensions	75 x 45 ft., area	3,375 sq. ft.
Below Paradise Cut-	Dimensions	714 x 80 ft., area	57,120 sq. ft.
Totals -------------------		1334 lin. ft.	101,370 sq. ft.

The total cost of the work aggregated the sum of $7,760.37, borne equally by the state and the property owners.

Banta Reclamation District. The conditions described above under the caption "District 17," obtained to an aggravated degree above the head of Paradise Cut. The department had previously constructed revetment at Lorenzen's Whirlpool and during the past two years has found it necessary to extend the work at that place and place protection at others, as follows:

Upper end of district, mattress	985 x 85 =	83,725 sq. ft.
	50 x 40 =	2,000 sq. ft.
Above mat at Lorenzen	100 x 80 =	8,000 sq. ft.
Below mat at Lorenzen	100 x 80 =	8,000 sq. ft.
Near Paradise Cut	460 x 80 =	34,500 sq. ft.
Totals	1695 lin. ft.	136,225 sq. ft.

The total aggregate cost of this work was $10,167.97; the state and property owners each paying one-half.

Unfinished work. In addition to the work accomplished according to the foregoing description, the department is engaged in executing new work at New Banta Reclamation District and Paradise Dam, estimated to cost $2,500 and $1,800, respectively. One-half of the estimated cost in each case is deposited by the property owners to cover their share of the expense.

Negotiations are pending for additional work to be done at Districts Nos. 17 and 544, but are not yet concluded.

Channel Explorations. A partial revival of navigation seems imminent on the San Joaquin River above Stockton. This being considered worthy of encouragement the department made a reconnaissance of the channel from Stockton to Hill's Ferry, a distance of 87 miles. It was found that to clear the channel of snags so as to render navigation safe at low and mid-stages of water, and do thoroughly as the department would only undertake to do, would require an expenditure of funds which the department was not prepared to meet alone. Effort to enlist the cooperation of navigation interests failed and therefore nothing has been attempted in the way of clearing the channel, nor is any extended effort contemplated, at least until the research now being prosecuted shall develop a flood control plan, in the carrying out of which the clearing of channels will necessarily be a part.

METHODS OF WORK.

The work of the river division is so erratic in its character that a large force of laborers is not employed continuously. Sometimes many "jobs" will be under way at once and several hundred men may be employed. Again there will be months when no constructive work will be in progress. Such conditions make employment transient in character and consequently no great number of men acquire experience in the work.

There are several men, however, who always seek employment with the department whenever work is to be had. They are steady and reliable; many of them saving their wages and depositing the money in savings banks. Such men can always be depended upon to be loyal to the employer in emergencies. It has been the policy of the department to give such men every consideration, and effort is made to find employment for them whenever it becomes necessary to suspend work on the river.

This policy has resulted in creating a small but dependable force of laborers skilled in the several manual occupations required in work on the rivers. These men are all enrolled in the civil service, and are an honor to that institution, but when the department requires a large force of men it is, perforce, compelled to draw upon the army of "professional unemployed."

Some of these also are enrolled as civil service employees, but the experience of the department is that even they are but little better than the unregistered "floater." In view of that fact and the further fact that the average duration of employment of transients, according to their own statements, is only about three and a half weeks it seems doubtful if any good is accomplished by maintaining a registered list of laborers for transient or temporary positions.

The department has many times made requests upon the Civil Service Commission for a force of 20 or 30 laborers and have only three or four to report for work. Recourse would then be had under authority of the commission to the employment of others, but in each case delay was encountered, and loss, in not having a full crew.

CAMP ARRANGEMENTS.

A separate camp is established at the site of each piece of work, and the men boarded at the camp. Care is exercised to keep the commissary up to a high standard, all foodstuffs being of fine quality and in good variety. Kitchen arrangements are complete and convenient, and cooking is required to be well and cleanly done. Kitchen and dining quarters are well screened and all garbage is taken care of in a sanitary manner. Large ice chests are provided for all perishable foods. Where the domestic water supply is not above suspicion all drinking water is either boiled or filtered or both.

Tents are provided for sleeping quarters restricting their occupancy to two persons to each ordinary-sized tent. The men are required to

PLATE XVI.

Bank Protection—A brush mattress with the brush grown into a dense mass, affording complete protection.

A heavy tow—a rowboat driven by a detachable motor, towing equipment.

furnish their own blankets, but each man is furnished with an iron-frame spring cot. Clean straw is provided and changed every week or whenever a cot is vacated. Cots are frequently washed with germicide solution.

Bathing facilities are provided, the tubs and showers furnished with hot and cold water. The water for bathing is heated by the same boiler furnishing water for washing clothes. Plenty of soap is furnished to each man. A large assembly tent is provided with a stove where men who get wet may dry their clothes before going to their individual quarters. Most of the small tents are furnished with heating stoves. In short every effort is made to maintain the camp in a comfortable and healthful condition.

Equipment. The river division possesses one large working barge 45 x 100 feet, one small barge 10 x 20, a small pile driver, one small pontoon fire engine, a kitchen houseboat, one towing launch, one fast dispatch launch, five rowboats and three portable skiff engines capable of driving the rowboats five to seven miles an hour. When work is required in several places at one time it becomes necessary to rent barges and hire towboats.

MISCELLANEOUS.

State Supervision of Dams. In the last report attention was called to the growing number of high dams being constructed for industrial purposes without supervision by public authority. Instances were cited where failure of dams with possible loss of life and property had been averted more by good fortune than otherwise.

In response to the suggestions made for provision to place all dams under state inspection and supervision, the legislature enacted an amendment to the act creating the Department of Engineering, containing the following provision:

> "It shall be the duty of the state department of engineering to pass upon all plans, specifications and estimates for the construction of dams now already constructed, in process of construction, or proposed to be constructed for the impounding of water other than the dams now coming under the authority of the California railroad commission." (Chapter 394, statutes 1915.)

The intent of the above quoted law is plain, but it is submitted that it confers little authority upon the Department of Engineering. "To pass upon plans" is not sufficient without authority to alter the plans if they are defective and to enforce compliance in construction with approved plans and specifications, or if the structure is already constructed and found to be unsafe the state's agent should be clothed with power to compel the adoption of measures to make it safe.

There are dams in course of construction or contemplated which will be more than 300 feet in height and hold in the canyons above them billions of cubic feet of water. The results from a failure of such a structure are appalling to contemplate.

It will be contended that the projectors of all enterprises requiring such structures employ the best engineering talent to be had and use every precaution to ensure the safety of the work. That may be granted, but the archives of the Department of Engineering contain the record of at least one dam constructed by a wealthy corporation according to plans and specifications which would be pronounced all-sufficient by any engineer. They would have been "passed upon" favorably by the Department of Engineering if submitted to it. Yet exploration extending to the interior of the dam showed that the specifications had been grossly ignored, and hidden disintegration had already progressed far. The company was not to blame, excepting for lax inspection, but some one had deliberately "skimped" the work and endangered the lives of hundreds of people living below the dam.

The law governing the Department of Engineering provides that:

> "All inspectors employed by the state engineer on any public work shall render to the state engineer a full, true and correct report of the kind, manner and progress of all work upon which he is such inspector. Any inspector who shall render a false report knowing the same to be false shall be guilty of a *felony*."

Also,

> "Any contractor or his agent or employee who shall knowingly permit the violation of the contract of such contractor to the injury of the state, or any agent or employee of any contractor who shall have knowledge of any work being done in violation of contract *and does not immediately notify* the department of engineering or the inspector upon said work in regard to the same *is guilty of a felony* and upon conviction thereof, shall be confined in the state prison for not less than one year nor more than five years and be liable to the state for double the amount the state may have lost or be liable to lose by reason thereof." (Chapter 38, statutes 1909.)

It is urged that the same penalty should apply to any owner, contractor or employee engaged in erecting any structure the weakness of which would be a menace to the lives and property of other people.

The Department of Engineering, feeling that the authority to "pass upon plans" is insufficient, and not having funds with which to cause inspections to be made, has confined its activities to only such cases as were brought to its attention by complaints.

Acting upon complaints or upon strong rumors that certain works were suspected of being inadequate, the State Engineer personally examined the Bear Valley dam in San Bernardino County, the Escondido dam in San Diego County, both constructed long ago, and the Woodward dam of the South San Joaquin Irrigation District, situated in Stanislaus County, being constructed, and in each case found that expressed fears as to their safety were without foundation.

The failure of the Lower Otay dam near San Diego, with a loss of several lives and the destruction of an immense amount of property, has been so well described in the news and technical press that it is unnecessary to enter into the details here. That dam was constructed without engineering advice in design or supervision in construction, and had been severely criticized by engineers as a departure from safe practice. Its failure at the first time that the reservoir was filled, with the dire results following, has aroused great fear in the minds of people residing below other dams, constructed or contemplated, and they are entitled to protection from a repetition of the Otay disaster so far as it is in the power of the state to give it.

It is urged that the inadequate law relating to state supervision of dams be strengthened by giving its agents ample powers, and that severe penalties be imposed for fraud in the construction of any important work affecting life and property, whether that work be public or private.

Bridges on Navigable Streams. Under the provisions of chapter 68, statutes of 1881, it is required that the plans for all bridges to be erected over navigable streams shall be submitted to the State Engineer, who shall designate the width of draw.

This office is convinced that the reviewing authority should have power also to prescribe other matters affecting the regimen of the stream, such as the location and position of piers and abutments, and protection to banks. Neglect of these matters, it is believed, was responsible a few years ago for serious breaks in river levee and the partial destruction of the offending bridge, the loss of which interrupted railway traffic for several months.

In another instance the obstruction to the flow of flood water caused by the erroneous placing of piers caused the loss of part of that bridge, injury to others, and loss of life.

The state should have authority to do more than specify the width of draw in a bridge.

No applications have been presented for approval since the last report.

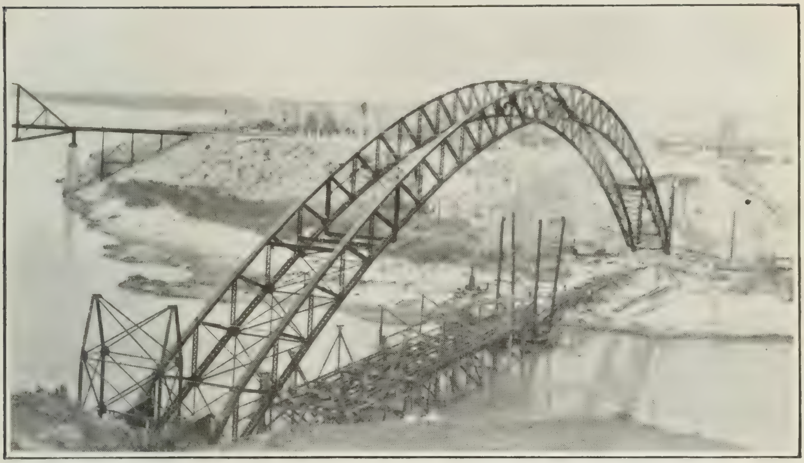
Bridges on Interstate Streams. The Department of Engineering has recently been brought into contact with the subject named at the head of this paragraph. The legislature appropriated $25,000 as the state's share of the cost of constructing a bridge across the Colorado River connecting Needles in California and Topock, Arizona. The Colorado River is the boundary between the two states at this point, and an Indian reservation occupies one bank of the stream.

The two states and the United States Indian Service cooperated in the construction of the bridge and under the terms of the agreement each state is responsible for the maintenance of the approach and that part of the bridge on its side of the center line of the river. While California assumes responsibility for maintenance of the west half of the bridge, that duty is placed upon San Bernardino County by the terms of the appropriation act.

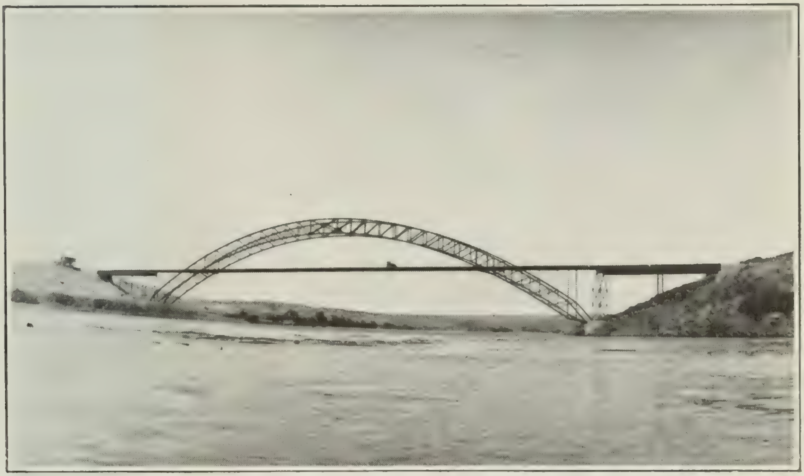
The bridge was designed by J. A. Sourwine, county surveyor of San Bernardino County. The designs were checked and slightly altered by the Department of Engineering, and the construction was executed under the direction of the Indian Service.

The bridge is quite a striking structure, being the longest three-hinged arch bridge in the United States.

PLATE XVII.



Interstate highway bridge over Colorado River below Needles, during construction.



Interstate highway bridge over Colorado River after completion.

SURVEY OF RESERVOIRS.

The growing importance of water storage in connection with irrigation, flood control, navigation and power production brings nearer the time when accurate knowledge must be had of all the storage possibilities existing.

The Department of Engineering is keenly alive to the importance of the subject and loses no opportunity to obtain information upon the subject, and is gradually accumulating data regarding location of possible reservoir sites, the size of dam required, capacity of reservoir and probable supply.

There is a popular belief that unlimited opportunities exist in the mountains for the storage of water, and that if they were utilized destructive floods would be prevented, and the waters be made available for use when the flow has diminished or ceased.

Investigation has shown that that belief is largely in error. Many good reservoir sites exist which can be utilized and which will render great aid in all of the ways mentioned, by reducing the critical flood peak, and by furnishing water late in the season for the various purposes requiring it at that time, but unfortunately when all practicable sites shall have been occupied their combined influence will fall far short of exercising the degree of control desired. To cite a case in point:

Upper Pit River Basin. Several years ago, a reconnaissance had discovered several basins in the territory drained by Pit River which appeared to offer opportunity for storage reservoirs. Surveys showed that four reservoirs could be created having a combined capacity of more than 4,000,000 acre-feet, and the sites were withdrawn from sale or entry pending the time when they could be devoted to public use. A considerable part of the land within the withdrawn areas had already passed to private ownership.

Years elapsed and no action was taken toward utilizing the sites and acquiring the lands privately owned. This condition created dissatisfaction, since a landowner could not dispose of his holdings and give a title guaranteed to remain undisturbed. So great did the dissatisfaction become that a bill was introduced in congress to restore all of the sites to public domain.

The Department of Engineering, feeling that no available reservoir site on public land should be restored to entry where it could, and if valuable would, be acquired to private ownership, effected a cooperative arrangement with the United States Reclamation Service and a survey was made, not alone of the four sites named, but of six others which had been represented as offering desirable advantages.

At the time the withdrawals were made there was no record of the quantity of water available to store in proposed reservoirs, but records of stream flow in the Pit River Basin have since then been obtained.

The result of the cooperative survey mentioned and study of the run-off records showed that a dam 100 feet high at the outlet of Big Valley would create a reservoir capable of holding 3,200,000 acre-feet of water. A dam 70 feet high at Warm Springs Valley would store 560,000 acre-feet. The capacity of a reservoir in Round Valley with a dam 100 feet high would be 185,000 acre-feet, while a 100-foot dam at Jess Valley would create 245,000 acre-feet of storage. The storage capacity of these four sites with a maximum height of dam of 100 feet aggregates 4,190,000 acre-feet, while the average annual flow at the Big Valley dam site is estimated to be 429,000 acre-feet.

At that rate it would require eight and one-third years to fill the reservoir, not allowing for evaporation losses, even if none were withdrawn for use and none stored in the other reservoirs.

The conclusions reached, as a result of the surveys and studies made, is that only two of the ten sites examined are practicable for storage. Round Valley has possibly 70,000 acre-feet a year available for storage and Jess Valley 50,000 acre-feet, making a total of 120,000 acre-feet of water that it is practicable to store in the basin above Big Valley, which amount would be deducted from the quantity estimated as reaching Big Valley site, leaving but 309,000 acre-feet, or less than one-tenth the capacity of that reservoir, available for storage.

The net result of the investigation was the abandonment of Big Valley site and all others, excepting Round Valley and Jess Valley, and the elimination of their 4,000,000 acre-feet of storage capacity, from all future calculations of storage in the Upper Pit River Basin.

The sites thus eliminated as probable factors in irrigation development of Upper Pit River Basin are:

Big Valley,
Warm Springs Valley,
Delta Lake,
Crooks Canyon,
Big Sage,
West Valley,
Widow Valley,
Ash Creek Valley.

Lower Pit Basin. The survey described above considered four sites in the drainage basin of Pit River below the Big Valley dam site. Two of these, Dixie Valley and Little Valley, are on Horse Creek, which enters Pit River about twelve miles below Big Valley. A third, at Great Spring, is located on Hat Creek, which joins the river near Carbon, some ten miles below the confluence of Fall River.

PLATE XVIII.

Hope Valley reservoir site, Carson River.

Reservoir site, Calaveras River.

(p. 114)

The elements of these sites are as follows, the capacity stated being the estimated quantity of water available:

	Dam		Capacity, acre feet
	Bottom length, feet	Height, feet	
Dixie Valley	100	50	25,000
Little Valley	100	70-100	30,000
Great Spring	250	75	60,000
		100	100,000

Most of the irrigable lands in the vicinity of these sites are already served without resort to storage, and as the nearest lands to be irrigated from water stored here are a hundred miles away, it does not appear that small reservoirs in this region are economically feasible at this time.

The fourth site considered embraces the valleys of Pit and Fall Rivers above their confluence. Here a dam 115 feet high would store about 750,000 acre-feet of water, and as the mean annual flow at this point is estimated to be 1,000,000 acre-feet, so far as the water supply is concerned a reservoir here is feasible. The cost of a reservoir here is quite low, being estimated as ranging between $7 and $8 an acre-foot. Notwithstanding the advantages of plentiful water and low cost, there are disadvantages that seem to remove the Fall River reservoir from consideration on economic grounds, at least for some time to come.

Surrounding the site is a vast territory of rugged mountain slopes, more or less covered with timber and affording grazing ground for immense herds of cattle. The usefulness of this great range would be greatly reduced if it were not that in the little valleys dotting it here and there hay enough is raised to feed the cattle during the winter months when the range is covered with snow.

The creation of the Fall River reservoir would destroy 50,000 acres of the best hay and grain land in the Pit River Basin. The economic value of these lands to the cattle industry of the surrounding country is so great that their use for reservoir purposes would not be justified under present conditions. The reservoir would be of little value as a factor in flood control, since the disastrous floods of the Sacramento River originate below the drainage basins tributary to the reservoir.

Iron Canyon Project. For many years it has been the dream of people interested in the development of the Sacramento Valley that some day a large area of the valley would be irrigated from the waters of Sacramento River stored in a reservoir in Iron Canyon near Red Bluff.

The government caused preliminary investigations to be made in 1904 and 1905 and following a visit to the site by Secretary of the Interior

J. R. Garfield, the studies were resumed in 1909 and a partial report rendered thereon. To further the project the Iron Canyon Project Association was formed, which in 1913 effected arrangements with the United States Reclamation Service for a complete investigation, the association furnishing a part of the funds. The investigation was conducted under the direction of Mr. E. G. Hopson, supervising engineer of the Reclamation Service. Upon the completion of the report Honorable Franklin K. Lane, Secretary of the Interior, appointed a board to consider the investigations of the Iron Canyon project and to report thereon.

The board of review appointed was composed of the following: Brigadier General W. L. Marshall, formerly Chief of Engineers, U. S. Army, and consulting engineer to the Secretary of the Interior, Chairman; W. F. McClure, State Engineer of California; D. C. Henney, Acting Chief Engineer, U. S. Reclamation Service, and H. T. Cory, Consulting Engineer, representing individual and corporate interests that would be affected by the project.

The report was dated October, 1914, and presented a very comprehensive plan for the irrigation of a large body of land at the head of the Sacramento Valley. A tract of 270,000 acres was selected, lying mainly on the west side of the river between Red Bluff and Willows. A tract of 10,000 acres on the east side of the river opposite Red Bluff was included in the project. The report does not assume that the tracts selected are the only lands susceptible of irrigation under the project nor that 270,000 acres is the maximum area that may be finally brought into the scheme.

The plans presented contemplate the construction of a dam in Iron Canyon, with appurtenant structures to serve different purposes, and a system of delivery canals to convey the water to the lands to be irrigated.

Three different sized reservoirs are considered, which are presented with their characteristics in the following table:

Storage at Iron Canyon Reservoir.

Height of dam	Capacity, acre feet	Cost of reservoir	Cost of storage per acre foot
110 feet	231,000	$4,325,000	$18 75
123 feet	420,000	5,000,000	11 90
132.5 feet	603,000	7,575,000	12 56

The cost of a canal system to deliver the water to the lands would be the same in either case and must be added to the cost of the reservoir to obtain the total cost of the project.

Several alternative plans enter into the figures of cost above presented, all based upon the irrigation of 225,000 acres of land, but with the works designed with consideration of other purposes also.

It is conceded that works of the magnitude of the proposed project will have a marked influence in the solution of the several problems of irrigation, navigation, flood control and power development, and all of these matters were considered in presenting several alternative plans.

In the designs three basic features are kept in view, viz:

I. 225,000 acres of land to be irrigated. Canal system to cost $8,400,000.
II. Navigation as conducted on the Sacramento River, requires a minimum flow of 4,750 second-feet at Iron Canyon.
III. The flood flow in the river has reached a maximum of 254,000 second-feet at Iron Canyon, and the river channel below is not capable of carrying more than 100,000 second-feet without overflowing its banks.

The several plans presented involve the following considerations:

1. Irrigation without storage; no dam; comprehensive river work to compensate for low water withdrawn, costing $4,000,000. Total cost	$16,325,000
2. Same as No. 1, omitting river work. Total cost	12,325,000
3. Dam and partial storage; river flow reduced to 3,700 second-feet; river improvement to cost $1,500,000. Total cost	14,200,000
4. Same as No. 3, but adding provision for 50,000 horsepower development. Total cost	15,950,000
5. Same as No. 3, but omitting river improvement. Total cost	12,700,000
6. Same as No. 4, but omitting river improvement. Total cost	14,450,000
7. Dam and storage; no reduction of river flow. Total cost	13,400,000
8. Same as No. 7, but adding provision for 60,000 horsepower production. Total cost	15,450,000
9. Same as No. 7, but adding provision for flood control, limiting flood flow to 100,000 second-feet. Total cost	15,975,000
10. Dam and storage; no interference with navigation flow; flood control limiting flood flow to 100,000 second-feet; provision for 70,000 horsepower development. Total cost	18,785,000

Other reservoirs in Northern California. Data of reservoirs obtained by reconnaissance for irrigation district or other enterprises in the Sacramento River drainage basin are on Last Chance Creek in eastern Plumas County and in Butte County.

Honey Lake Valley Reservoirs. Records have been obtained concerning the following proposed reservoirs in the drainage basins tributary to Honey Lake:

	Height of dam	Capacity, acre-feet
Baxter Creek	52	13,000
Warm Springs, Long Valley	130	93,000
Red Rock Valley	110	35,000

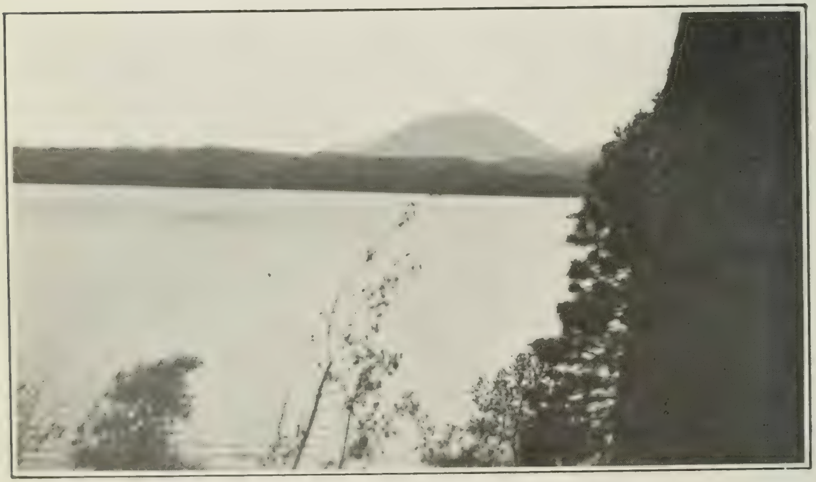
San Joaquin River Basin. Data have been obtained concerning two reservoir sites on Kern River, one each on Kaweah, Kings and Calaveras rivers and two on Cosumnes River, none of which had been recorded heretofore.

Reconnaissances were made of another on Kings, and one on San Joaquin River.

While the data concerning the possibility of storage at the places named have not been analyzed, and much of it not verified, still it will be valuable in studies of flood control and navigation as well as of irrigation.

PLATE XIX.

Dam, McCoy Flat Reservoir, Susan River.



Bidwell Lake, Lassen County; Cinder Cone in distance.

SAN FRANCISCO HARBOR FRONT.

The harbor front of the city of San Francisco is state property and is administered by a Board of State Harbor Commissioners, which has jurisdiction over the construction, operation and maintenance of the docks, wharves, buildings and appurtenances of every kind. The board reports directly to the Governor.

All engineering, including design and construction, is by law placed in the Department of Engineering, and is exercised through a chief engineer of the Board of Harbor Commissioners appointed by the department.

Mr. Jerome Newman occupied that position until June 30, 1916, when he resigned and was succeeded by Mr. Frank G. White.

Mr. Newman's report, made to the Harbor Commission at the close of his term, is here presented:

REPORT OF CHIEF ENGINEER, SAN FRANCISCO STATE HARBOR COMMISSION.

By JEROME NEWMAN, Chief Engineer.

Herewith I beg to submit my report as chief engineer of your board, for the term beginning July 1, 1914, and ending June 30, 1916.

As mentioned in my biennial report for the term ending June 30, 1914, there were under construction on the latter date the following structures, which are described in the report:

Section A of the seawall which was 76½ per cent completed.

Section 9 B of the seawall for which a contract had been awarded, but on which work had not begun.

Pier 46, which was 46 per cent completed.

Pier 41, which was 21 per cent completed.

Pier 15, which was 6 per cent completed.

Repairs to Pier 19, which were 12 per cent completed.

Belt Railroad extension to United States Army Transport Docks at Fort Mason, which was 47 per cent completed.

Car ferry slips, which were 4 per cent completed.

Sewering and paving the southerly half of Bryant street between Main and Spear streets and the easterly half of Spear street from The Embarcadero to near Harrison street.

Sewering and paving The Embarcadero from Pier 34 to Pier 26, which was 2 per cent completed.

All of these contracts have been completed and the structures placed in service.

The various subdivisions of the work of the Engineering Department will be reported on separately, as follows:

1. Construction, piers and wharves.
2. Maintenance and repairs.
3. Belt Railroad.
4. Ferry slips and buildings.
5. Street work and maintenance.
6. Electrical department.
7. Dredging.
8. Testing department.

1. Construction.

Piers and bulkhead wharves.

Besides contracts for the construction of several new piers, a number of others were let for additions and improvements to existing structures in connection with repairs which were necessary to place them in good condition. The new piers are numbered 24, 22, 18, 16, 29, 35 and 37; the piers to which additions and improvements were made being numbered 44, 38, 12 (new number 20), 9, 13 (new numbers 7 and 11), 21.

New piers and extensions to existing piers.

Pier 24. This pier is 127 feet wide with a length of 800 feet. The substructure is creosoted piles, supporting a timber deck covered with asphalt in the cargo space and outside the shed, with a pavement of wood blocks in the driveway. There is a depressed track on the northerly side.

The shed is of timber, 98 feet wide by 790 feet long, with rolling steel doors, and has an elevated gallery for the use of passengers. The fender line is creosoted piling protected by untreated Oregon pine sheathing.

As in the case of all piers built in the last two years, the shed has an ornamental front, extending over and along the bulkhead, constructed of timber covered with cement plaster. This bulkhead building is 44 feet deep by 130 feet long.

Pier 24 was completed in September, 1915.

Pier 22. This pier is 125 feet wide by 407 feet long, the length being determined by the depth of water at the outer end; it is expected that the shoaling consequent on the construction of the piers in this vicinity will permit of its being lengthened in a few years, if required.

The substructure is creosoted piles with a timber deck covered with bituminous concrete and with a wood block driveway. There is a flush track on the northerly side. The fender line is similar to that on Pier 24.

The shed is timber, 100 feet wide by 395 feet long with a bulkhead building 44 feet deep and 130 feet long built of wood covered with cement plaster.

Pier 22 was completed in March, 1916.

Pier 20 Extension. In connection with the construction of Piers 16 and 18, it was decided to lengthen Pier 20 (old number 12) in order to afford more berthing and storage space. A portion of the inner end of this pier had been removed to make room for the construction of Section 9 B of the seawall and after the extension had been completed the inner end was rebuilt and a new bulkhead building added of timber covered with cement plaster, uniform with the structure in front of Piers 16 and 18.

The extension is 111 feet wide by 72 feet long, with a creosoted pile substructure and wooden deck and driveway. The flush track on the northerly side was extended with the pier.

This extension was completed in December, 1915.

Piers 16 and 18. Although built under separate contracts, these piers may be considered as one structure, as they are similar in plan and have a continuous bulkhead building between them and extending to the southerly side of Pier 20.

Each pier is 140 feet wide by 686 feet long, and has a creosoted pile substructure carrying a wooden deck covered with asphalt, except in the driveway which is paved with wood blocks, and is provided with two tracks, the northerly one being depressed and extending the entire length of the pier and the southerly one being a short flush track. The fender line is the usual creosoted pile type with untreated Oregon pine protection.

The piers are arranged for convenient handling of coastwise freight and passengers in conformity with the wishes of shipping men. There are side aprons for handling freight, and elevated landing bridges leading to galleries for the use of passengers.

The sheds are timber, 101 feet wide by 680 feet long, with steel rolling doors. As mentioned above, there is a continuous bulkhead building, 41 feet deep by 773 feet long from the northerly side of Pier 16 to the southerly side of Pier 20, containing work rooms, waiting and baggage rooms and offices of the company to which the piers are assigned.

Pier 16 was completed in May, 1915, and Pier 18 in June, 1915.

Pier 29. This pier is 200 feet wide by 800 feet long. The inner 600 feet is supported on reinforced concrete piles, the outer 200 feet on account of the depth of mud, on concrete cylinders resting on timber piles. The deck is of the usual transverse girder, longitudinal beam and slab type covered with asphalt, except in the driveway, which is paved with wood blocks. There are two tracks, one on each side, the northerly one being depressed and the southerly one flush. The fender line is creosoted pile with untreated Oregon pine sheathing.

In addition to the pier, the contract included the construction of a section of reinforced concrete bulkhead wharf, 44 feet wide and 608 feet long, extending each side of the pier. This bulkhead wharf is similar in type to that described in connection with Pier 39 in the last biennial report.

Plans for a shed are being prepared and will be ready for contract when the pier is completed.

Pier 29 was 68 per cent completed June 30, 1916.

Pier 35. This pier is 200 feet wide, with an average length of 896 feet. The substructure is reinforced concrete piles, carrying a reinforced concrete deck covered with asphalt, except in the driveway which is paved with wood blocks. The northerly one of the two tracks is depressed, the southerly one flush. The fender line is similar in construction to that on Pier 29.

The construction of Piers 35 and 29 presented some interesting problems in casting and driving reinforced concrete piles. The plans as originally prepared, called for 92-foot piles at the outer end, but before reaching this point it was found that the unfavorable foundation required the use of longer piles and it was decided to substitute piles 106 feet long, 20 inches square and reinforced with eight one-inch bars. These very long and heavy piles, weighing 23 tons each, were successfully handled and driven and are believed to be the longest piles of this kind ever used.

The shed is timber, 160 feet wide and 900 feet long, covered with asbestos-protected metal, which material was selected on account of its fire-resisting qualities, and is fitted with steel rolling doors. There is a bulkhead building in front of the shed, 33 feet deep and 316 feet long, constructed of timber covered with cement plaster.

The contract for the pier included a section of reinforced concrete bulkhead wharf, 45 feet wide and 494 feet long, similar in type to that built at Pier 29.

Pier 35 was completed in June, 1916.

Pier 37. This pier is 200 feet wide with an average length of 937 feet. It has a creosoted pile substructure carrying a wooden deck covered with asphalt, with a wood block pavement in the driveway. There are two tracks, the northerly one being depressed, the southerly one flush. The fender line is of the standard creosoted pile type, similar to those on Piers 29 and 35.

The shed is timber, 160 feet wide and 940 feet long, provided with steel rolling doors. There is a bulkhead building 33 feet deep by 348 feet long, of timber covered with cement plaster.

The contract for this pier also included the construction of a reinforced concrete bulkhead wharf 45 feet wide and 607 feet long of the same design as that used at Pier 29.

Pier 37 was completed in June, 1915.

Additions to existing piers.

Pier 44. In connection with the repairs to this pier, which will be described under "Maintenance and Repairs," a new bulkhead wharf building 32 feet deep and 147 feet wide is to be constructed. This building is to be of timber, covered with cement plaster.

This addition was 5 per cent completed on June 30, 1916.

Pier 38. The center track originally built on this pier having proved unsatisfactory, it was decided to replace it by a depressed track on the northerly side. This required the construction of an addition 20 feet wide and 540 feet long, supported on creosoted piles, carrying a timber deck, covered with a seal coat of hot asphalt and coarse sand, and having the standard creosoted pile fender line.

This addition was 2 per cent completed on June 30, 1916.

Pier 7 (old number 9). In connection with the repairs to this pier, a new bulkhead wharf building, 30 feet deep and 300 feet long, was constructed; this is timber covered with cement plaster. To adapt the pier for coastwise traffic, new cargo aprons, passenger bridges and an elevated gallery were also added.

A reinforced concrete bulkhead wharf, 44 feet wide and 363 feet long, was built under the same contract as the bulkhead wharf building; this wharf is of the same type as the one at Pier 29.

The addition to Pier 7 was 83 per cent completed on June 30, 1916.

Pier 11 (old number 13). Under the contract for repairing this pier, extensive additions were made, consisting of an extension to the shed, a bulkhead wharf building, a depressed track on the northerly side and a section of reinforced concrete bulkhead wharf.

The old shed, which covered only the outer half of the pier, was extended over the inner half for 416 feet, and a timber bulkhead wharf building 30 feet deep and 126 feet long, covered with cement plaster, was added.

The addition for the depressed track is 18 feet wide and 800 feet long; the substructure is creosoted piling, carrying a timber deck covered with bituminous concrete.

The concrete bulkhead wharf is 44 feet wide and 363 feet deep, and similar in design to the one at Pier 29.

These additions were 50 per cent completed on June 30, 1916.

Projected work.

Plans for new work are in course of preparation as follows:

Track and addition to Pier 40, to replace the present center track; these are 90 per cent completed.

Pier 3, to replace present Pier 5, with adjacent bulkhead wharf, 50 per cent completed.

Bulkhead wharf buildings at new Pier 3; these are 30 per cent completed.

Shed on Pier 29; these are 5 per cent completed.

Pier 31, north of Pier 29; these are 10 per cent completed.

Bulkhead wharf between Piers 29 and 31; these are 5 per cent completed.

Bulkhead wharf buildings at Piers 29 and 31; these are 10 per cent completed.

Shed on Pier 29; these are 5 per cent completed.

Extension of southerly dolphin of car ferry slips; these are completed and ready for contract.

2. Maintenance and Repairs.

In accordance with the practice of the board, the ordinary repairs to piers, wharves and slips have been made by the state force. Several contracts were let for large repair jobs on various piers, together with additions to these structures, which latter have been described under the head of "Construction."

The piers to which repairs were made by contract are Nos. 44, 7 (old number 9), 9 (old number 11), 11 (old number 13), 19, 21, and 23. Of these, Nos. 44, 7, 11, 13, 19, 21 and 23 are concrete cylinder piers, built by the old method of depositing concrete in water, and were in bad condition. The repairs to these piers were made by taking down and removing the defective cylinders and replacing them with creosoted piles which will insure a further useful life of about 15 years. Pier 9 is a creosoted pile structure and the repairs were made by driving the necessary new piles.

In all cases, the decks were repaired at the same time as the substructure and, where possible, were covered with asphalt or bituminous concrete.

The cylinders supporting the main and side aprons in ferry slips 1 and 2 were examined by divers and found to be in a dangerous condition. These cylinders were of the old type and plans for replacing them with concrete piles have been completed and arrangements made to have the work done partly by state forces and partly by contract.

The steel rolling doors on piers constructed some years ago are in need of repainting and contracts are to be let for cleaning and repainting them as opportunity offers.

3. Belt Railroad.

Owing to the increased mileage and consequent large amount of traffic on the Belt Railroad, the work of maintenance has become heavier and the tracklaying force has been busily employed. In addition to ordinary maintenance, numerous turnouts have been laid to new piers and new tracks built on existing piers when requested by the tenants. As mentioned in the last report, all piers of sufficient width are provided with two tracks, one surface and one depressed, those not wide enough for two tracks having only one. Latterly the occupants of piers have shown a decided preference for depressed tracks and it would seem that this type be considered standard, to be departed from only on the request of the user.

The extension to the Transport Docks was completed October 29, 1914, and has been rendering good service since that date. The federal government is considering an extension of this line and negotiations for right of way have been begun.

4. Ferry Slips and Buildings.

Passenger slips 7, 9 and 10, described in the last report, were completed, as planned, in January, 1915.

The car ferry slips, also described in the last report, were completed in December, 1914.

The buildings described, viz: Ferry Building extension, Post Office, and Wells Fargo & Company's building have also been completed as follows:

Ferry Building extension, in February, 1915.

Post Office, in August, 1915.

Wells Fargo & Company's building, in May, 1915.

The Ferry Building extension, which contains baggage rooms used by the Southern Pacific and the Western Pacific, was very useful during the exposition period in taking care of visitors, and the Post Office now handles practically all mail for the business section, saving time in collection and delivery and expense in distribution.

In addition to the buildings enumerated above, several others have been constructed for various purposes as follows:

A fire house for the use of the San Francisco Fire Department, located on the bulkhead wharf between Piers 22 and 24. This is a two-story timber building, 38 feet by 62 feet in size, covered with cement plaster and containing a garage for a motor drive engine, with living and sleeping rooms for the company. This building was completed in April, 1915.

A building for the use of the launch companies, located on the bulkhead north of Pier 16 and containing storerooms and offices. This building is 20 feet by 164 feet in size, is constructed of timber and covered with cement plaster. It was completed in March, 1916.

A small ticket office for the Southern Pacific Creek Route ferry, 21 feet by 30 feet in size, of timber covered with cement plaster. This was completed in January, 1916.

A timber shed for the American Express Company on the dolphin between Slips 9 and 10. The front portion is 60 feet by 100 feet, the rear 65 feet by an average width of 82 feet. This was completed in August, 1915.

5. Street Work and Maintenance.

On account of the increase in vehicular traffic during the last two years, the paving force has been extremely busy on repair work. In addition to this, a considerable amount of new work has been done by contract as follows:

Sewering and paving the southerly half of Bryant street between Main and Spear streets, and the easterly half of Spear street from The Embarcadero to near Harrison street, mentioned in the last report. This was completed in November, 1914.

Sewering and paving The Embarcadero from Pier 34 to Pier 26, also mentioned in the last report. This was completed in September, 1914.

Paving the approaches to The Embarcadero on Main and Fremont streets; completed in November, 1914.

Laying an asphalt sidewalk from Pier 3 to Pier 13; completed in December, 1914.

Paving Jefferson street between Leavenworth and Hyde streets; completed in April, 1915.

Paving that portion of The Embarcadero between Market and Folsom streets reclaimed by the construction of the seawall, and laying a concrete sidewalk to south of the Post Office. To provide for settlement, the pavement was constructed of bituminous macadam, the intention being to replace it with permanent material when the subsidence has stopped. This work was completed in December, 1915.

Paving The Embarcadero between Brannan and Harrison streets; completed in February, 1916.

Laying an asphalt sidewalk on the east side of Sansome street, between Lombard and Chestnut streets; completed in January, 1916.

6. Electrical Department.

The electrical department during the past two years has been continuing the work of extending the underground system of state wires, both for lighting and signal purposes.

The electric lighting system along The Embarcadero has been extended from Pier 22 northerly to the Ferry Building and from Pier 27 northerly to the car ferry slips at the foot of Mason street; 25 additional electroliers have been installed between Pier 22 and the Ferry Building, and 30 are being placed north of Pier 27. When the installation of the latter is completed, there will be a continuous line of high efficiency electroliers, 140 in number, from Channel street to Mason street, directly controlled from the central switchboard in the Ferry Building.

Pier illumination has been greatly improved by the substitution of the new nitrogen lamp for the old style Mazda type, and Piers 24, 22, 20, 18, 16, 9, 35 and 37, the Post Office, Wells Fargo & Company's building, American Express Company's office, launch offices and the fire house have been wired.

The lighting of the Ferry Building, which was quite unsatisfactory, has been bettered by the introduction of a system of indirect lighting, which has also been installed in the Post Office and other buildings in the vicinity.

The underground conduit system for Harbor Commission wires, which is planned between Channel and Mason streets, has been extended to Pier 11 from Harrison street; conduits are now being placed in sections 2 and 3 of the seawall, and the section from Pier 11 to Mason street is about 75 per cent completed.

In conformity with plans adopted some years ago, all poles and overhead wires, with the exception of those owned by the street railroads, have been placed underground.

Twenty-two new fire boxes have been authorized and are being installed on The Embarcadero; these are connected with the fire alarm system of the city.

A new system of 39 fire alarm boxes has also been installed in the Ferry Building and is to be connected with the city's system.

The remote control system has been enlarged to include all street and pier lighting between Channel and Mason streets.

Tugs and dredgers.

Besides the routine work of dredging, this department has been engaged in pulling piles at the sites of new piers before and after completion.

As mentioned in the last report, the equipment, owing to its age, entails excessive cost of maintenance, which is growing larger yearly, and the time will soon arrive when as a matter of economy its replacement should be considered. This is particularly the case with scows at present in use, some of which are 30 years old and have been in service continuously.

Testing department.

Since the last report, the testing laboratory has increased in size and equipment. The installation of the 150,000-pound machine has rendered possible the physical testing of all structural metals, concrete, brick, etc., in addition to which the local shop inspection of structural steel has also been handled.

An important part of the work of this department has been the investigation of asphaltic cements, asphaltic concrete, prepared roofing, saturated felts and paints for structural steel, wood and concrete. The work of the department along these lines has saved the state many thousands of dollars and it would be extremely unwise to curtail this work, as proposed, by the reduction or elimination of the force employed.

In addition to the regular work of the Harbor Commission, numerous tests have been made for the State Department of Engineering and the Highway Commission, these tests have been made without charge, and have been of material assistance to the two departments.

IRRIGATION.

Irrigation is defined as the watering of land by artificial means to promote the growth of agricultural crops.

It is one of the oldest arts of man, antedating historical records, as evidenced by the remains of irrigation works in Asia, Africa and the Western Hemisphere. Modern canals in Mesopotamia utilize portions of old conduits believed to have been irrigating canals used in the days when Adam was condemned to "eat bread in the sweat of his face."

Irrigated lands are usually fertile, and irrigation tends to intensive cultivation. In Italy 800 people to the square mile live and draw their sustenance from irrigated lands. In Egypt 900, and in parts of India 1200 are supported on a square mile.

Modern irrigation in California dates back nearly 150 years to the founding of the missions by Junipero Serra and his intrepid compatriots; the ruins of whose works testify to the energy and versatility displayed by those wonderful men.

Evidence also exists which indicates that irrigation had been attempted long before the coming of the padres. In Kern and Tulare counties are old ditches in the bottoms of which large oak trees, centuries old, are growing. When white people discovered them, the oldest Indians had no traditions concerning their builders. Nor do the records of the missions show that any settlements ever were made by the Franciscans in the far interior.

Speculation suggests that possibly a Spanish galleon voyaging from the Philippines some time in the sixteenth century, being chased from its course by an English privateer, was wrecked on the coast. The crew might have wandered inland and attempted to establish irrigation as it was practiced in the fatherland. This theory is strengthened by the fact that in the early days of white settlement, in the country about the old ruins, many articles were found, such as sword-blades, spear heads and knives, of Spanish manufacture, and crude homemade spurs of Castilian pattern.

When irrigation was introduced into California will probably never be known, but its effects on production of the necessaries and luxuries of life are recognized the world over.

In all the countries of the world which keep records of such things (excepting China) there are said to be 100,000,000 acres of land[1] susceptible of irrigation, of which 45,000,000 acres are in the United States.

According to a census taken in 1912 for the California Conservation Commission the state contains about 21,000,000 acres of tillable land that would be benefited by irrigation if water could be obtained and applied.

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[1] Nelson's Encyclopedia.

The records of stream flow indicate that the annual run-off of water from all the streams in the state aggregates 60,000,000 acre-feet, or nearly three acre-feet of water for every acre of irrigable land.

But, unfortunately, only a small portion of that large quantity can be made available. Most of the run-off is in winter and spring floods, at such times when the lands do not need the water, and in such quantities that only a small part could be diverted for use if the lands were ready for it.

It is estimated that about 11,000,000 acres of irrigable lands can be irrigated at a cost not prohibitive, and it is not improbable that when all of this land is brought under cultivation, scientific methods will enable a given quantity of water to efficiently serve a larger area than now obtains.

By scientific methods is meant, not alone the application of science in methods of procuring the water, of storing it, and of conveying it long distances, without unnecessary loss—not only scientific methods of applying water to the lands in the proper quantities at the right times and in the correct way to get the greatest benefits; but science will teach, as well, the kinds of crops and the best way to manipulate the soils so as to conserve the moisture.

''Brain and brawn'' must be used with the water in its application before the fruits of irrigation shall be harvested to their uttermost fullness. When it is known that a community has a fixed and limited quantity of water for its lands, it must learn what kind of crops will give the best returns for that amount of water, and no one must be permitted to cultivate other crops which demand a larger quantity.

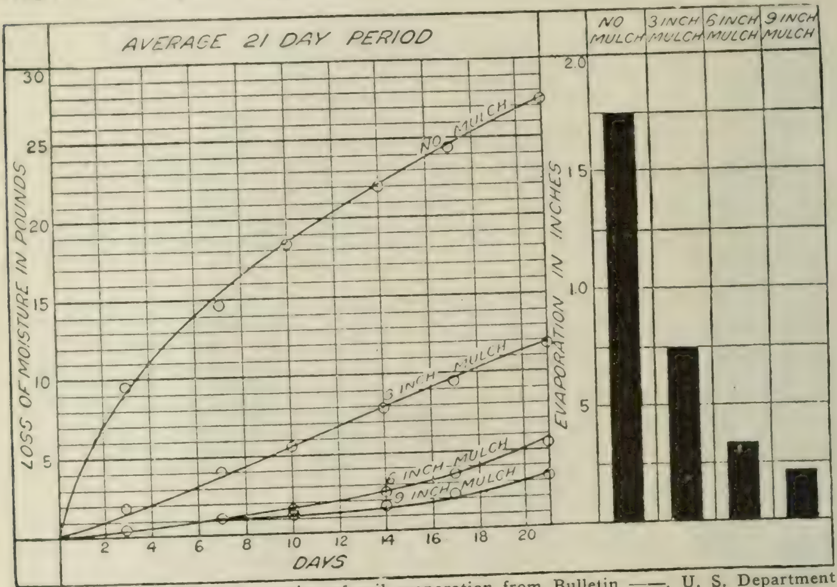
When it is known that vigorous stirring of the soil will conserve the water applied in irrigation by preventing evaporation, the area served can be extended to the extent that the water is saved from evaporation.

Experiment has shown that where water was applied to soil to the depth of six inches and the soil left untouched after the water was absorbed, the loss by evaporation in three weeks amounted to one and three-fourths inches, or nearly 30 per cent. When the surface of the soil was stirred so as to produce a mulch three inches deep the evaporation was three-fourths of an inch, or 12½ per cent of the water applied. and when the mulch was nine inches in depth the loss from evaporation amounted to only four-tenths of an inch of water or less than 7 per cent of that applied. The conclusions deduced from the experiments are:

1. A dry, granular mulch three inches deep will save, other conditions being equal, at least one-half of the loss from an unmulched surface.
2. A like mulch six inches deep, will save 75 per cent of the evaporation from an unmulched surface.

3. In comparing the efficiency of a six-inch mulch with a nine-inch mulch, the result shows a considerable saving in water by the deeper mulch, but the cost of cultivation and other practical considerations would seem to limit the depth to six inches or less.

The following figure graphically illustrates the loss occurring from evaporation as just described.



Effects of cultivation on prevention of soil evaporation from Bulletin ——, U. S. Department of Agriculture.

But this is not the only preventable loss. Ditches excavated in broken rock and absorbent soil lose a large part of the water carried by them. Different degrees of porosity, of course, affect the amount of loss from percolation. In some cases in mind, where the water is conveyed several miles in side-hill ditches, it is found that when only 100 second-feet of water is available at the head of the ditch the loss between that point and the nearest point of use is 100 per cent. That is to say, all is lost and unless more than the quantity stated can be turned in no attempt is made to take any.

Government investigators have reported that the average losses of water in its application for irrigation was 60 per cent, and not infrequently only 20 per cent of that delivered to the land was usefully applied.

With 20 to 50 per cent of the water diverted lost in transmission through leaking conduits, 60 per cent of that reaching the lands wasted by wrong methods of application and 30 per cent of that correctly applied being lost by preventable evaporation, aggregating a total loss of 80 per cent and leaving only about 20 per cent of that diverted to be utilized in support of plant life it is plainly seen that much remains to be done by conservation.

Storage of waste flood waters, conveying them in nonleaking conduits, economical application to the soils, selection of crops best adapted to the conditions, and thorough cultivation to reduce evaporation, all will conduce to the great extension of irrigated areas with the waters available.

Several agencies, federal and state, are engaged in research with a view of some day bringing the water to the land and getting the most out of it.

It is known that many opportunities exist for storing waste waters, and these are being examined, measured and catalogued as opportunity and funds permit. In many localities are underground stores of water. Their extent and availability, as well as means of increasing them, are being studied as extensively as means are provided.

These investigations are being conducted by the Department of Engineering and other agencies of the state, acting alone or in cooperation with various departments of the national government.

The state and government cooperate in experiment and investigation into the matters of applying water for irrigation and its effects on different crops. The reports upon these matters are published from time to time as bulletins and in the aggregate contain a vast amount of valuable information.

IRRIGATION DISTRICTS.

The gradual decline of wheat farming on the dry plains, with a demonstration in a few favored spots of the benefits to be had from irrigation, stimulated a desire on the part of homesteaders to irrigate their lands. But to build diversion dams and long canals is expensive and wholly beyond the financial ability of the individual farmer to accomplish.

The need for some method of cooperation led to the enactment in 1887 of the so-called Wright Irrigation District Law. Under this law many districts were formed. Many of them were meritorious, but most were created without knowledge of the elements necessary to success. Some were speculative—"wildcat" schemes, pure and simple.

The administration of the act was beset by many difficulties and led to prolonged and costly litigation. Practically every provision was attacked in the courts and some of the cases were carried to the highest courts of the nation for decision.

In 1897 the Bridgeford act was passed, embracing the best parts of the old Wright act and other provisions which the court decisions and experience had shown to be desirable. From the passage of the original Wright act, March 7, 1887, great activity was manifest in cooperative attempts to extend irrigation. Within eight years 49 districts were organized. The years of greatest activity were 1890 and 1891 when 11 and 13 districts, respectively, were brought into being.

The 49 districts embraced more than 2,000,000 acres of land, and the several districts voted an aggregate of upwards of $18,000,000 in bonds with which to finance their several schemes.

That the proponents of irrigation under the district system were overzealous is shown by the fact that only nine of the entire number formed succeeded in maintaining and operating their organizations.

The various causes which led to the nonsuccess of the districts is clearly set forth in a history of irrigation districts compiled by Frank Adams, irrigation manager, Office of Public Roads and Rural Engineering, United States Department of Agriculture, and published early in 1916 by this department as Bulletin No. 2.

The demand for the little volume was so great that the issue was quickly exhausted and to meet the frequent requests for copies it is herewith reprinted as Appendix B to this report. A perusal of this history is commended to the student of cooperative effort for industrial development.

As stated above, only nine of the districts created under the Wright act survived, and the struggles of eight of them to live through the years of adversity were nothing short of heroic. The one lone exception was Walnut District in Los Angeles County, containing 870 acres. It acquired an existing ditch system which it has continued to successfully operate without resort to a bond issue.

Some of the other districts never progressed to the point of issuing bonds. Others voted bonds in varying amounts, from $3 to $88 an acre. It is said that not one of those issuing bonds but at some time defaulted in interest payments.

Nearly all of those surviving compromised with the bondholders and either paid off their indebtedness in cash at a great reduction, or issued new bonds which were exchanged for the old ones, in some cases paying less than 30 per cent of the face value of the indebtedness.

The causes for the failure of the districts were so numerous, and are so well explained in the appendix above named, it is not necessary to enumerate them here. Lest the reader should unthinkingly condemn the irrigation district system, he is earnestly urged to read the history of the rise and progress of the districts as set forth by Mr. Adams.

Most of those districts which reorganized, paid off their indebtedness, and again started with a clean balance sheet, as it were, have been successful in building up prosperous communities.

The Wright act, in its general provisions, was incorporated into the laws of many western states and the results in all were very similar to those in California.

The experience of investors who lost not only the interest for a long term of years, but as stated above, also sacrificed a large part of the principal invested, caused all bonds issued for the development of irrigation enterprises to be regarded with ill favor in the financial marts of the world. It became impossible for irrigation districts in California or elsewhere, no matter how meritorious the project might be, to dispose of their bonds excepting at ruinous rates of discount.

With a view of restricting the haphazard formation of districts and of controlling the administration of those formed so as to make it more difficult to create indebtedness, drastic changes were made in the law by the substitution in 1897 of the Bridgeford act for the Wright law. Further amendments were enacted from time to time, all looking to raising the credit of irrigation districts to a firm basis.

One of the reasons given for the low value of irrigation district bonds was the fact that they were not available for all the purposes accorded to school district, county and city bonds. Because of the uncertainty inherent in many irrigation enterprises as to their ability to develop, and the absence of authority outside of the district itself to determine the feasibility of successful development, it was difficult to enlist legislative sanction to placing irrigation district bonds on a parity with the others mentioned. A law was enacted in 1911, and since amended, providing that irrigation district bonds would be given all of the privileges accorded to other bonds provided they were certified by the State Controller as having been approved by a commission created for the purpose.

In 1913 the district law was amended so as to require the State Engineer to examine and report upon the feasibility of the project before the organization of a proposed district. Also requiring plans and estimates to be submitted for his approval before bonds could be issued.

While these provisions of the law are quite fully abstracted in the addenda to Appendix B, it is considered desirable to epitomize here those provisions wherein the Department of Engineering is brought into close relations with the formation of new districts and the issuance of bonds by all districts for the acquisition of water or of works to supply water to the districts.

Organization.

To organize a district there must be presented to the Board of Supervisors of the county in which the proposed district is situated or in which the greater part lies, a petition praying for the organization of such district. Said petition must be signed by a majority in number of the landowners within the district, representing a majority of the value of the lands in the district according to the last equalized assessment thereof made by the County Assessor. Said petition must be presented at a regular meeting of the board.

A notice that said petition will be presented must be advertised in some newspaper, having a general circulation in the proposed district, for a period of two weeks before the date of presenting it to the Board of Supervisors. Said notice must recite the intention to present the petition, state the source or sources of water supply and the lands to be embraced in the district, or the boundaries thereof. On or before presenting the petition a copy of the notice must be filed in the office of the State Engineer.

Upon its presentation the board proceeds to consider the matter as to whether the petition contains the names of a majority of the property owners, and whether the petitioner represents a majority of the value of land in the district.

Minor irregularities are not considered, but finding that the petition complies with the requirements of law in the two matters mentioned, the board by resolution so declares; directs a copy of said resolution to be forwarded to the State Engineer; and continues hearing thereon "for one month or from time to time *not exceeding one month in all.*"

The State Engineer is required to make such examination of the project as he deems necessary. He gives particular attention to the following three matters:

1. Whether there is a sufficient supply of water available. The proponents of the district may not have a right to any water, but if it can be had by appropriation under the laws of the state, or if there is a sufficient quantity that may be purchased, or if water in sufficient quantity is being used for other purposes and can be acquired by condemnation under right of eminent domain, it is "available."
2. Whether the lands are susceptible of irrigation. By "susceptible of irrigation" is taken to mean that by irrigation the production and value of crops will be enhanced to an extent commensurate with the cost.
3. Whether the water and the works to deliver it to the land will not cost more than the lands can reasonably pay.

Finding the three conditions favorable, the district is feasible and the State Engineer reports to the Board of Supervisors that he does not find anything that would warrant him in reporting against the formation of the district.

If the State Engineer reports that the district is not feasible and makes no recommendations for changes, then hearing by the board must be continued for one month and then dismissed, unless a petition be then presented signed by three-fourths of the landowners in the district, praying for the formation of the district. In such case, the Board of

Supervisors may complete the formation of the district notwithstanding the adverse report of the State Engineer.

The State Engineer may find that the available supply of water is not sufficient for the purposes of the district as proposed, in which case he may recommend another or additional source, or the modification of the area of the district to correspond with the water supply. He may recommend the exclusion of lands not susceptible of irrigation, or the inclusion of other desirable lands in the district.

His recommendations may be adopted by the board or not, as it pleases, but unless he reports against the formation of the district, it may be formed as the board sees fit. The State Engineer's recommendations are advisory only.

Should the State Engineer fail to report, "it shall not jeopardize the formation of the district," the law says, and in the absence of a report the Board of Supervisors may authorize the formation of the district.

The State Engineer's report having been favorable, or his recommendations approved, the Board of Supervisors fixes a time for election, appoints election officers and advertises the date and purpose of the election to form the district.

At the election, all persons qualified to vote at any general election may participate. In addition to voting upon the question of organizing the district, the electors also vote for the officers of the district, three or five directors, as indicated in the petition, and ordered by the Board of Supervisors, an assessor and tax collector.

The result of the election is canvassed by the Board of Supervisors. A majority vote carries, and upon the qualification of the officers elect they assume charge of the affairs of the district.

The directors of a district are authorized to incur indebtedness in behalf of the district, for engineering services and other business of the district to the extent of 50 cents an acre, or in case of a district of less than 4,000 acres, the limit of indebtedness is $2,000. Against this indebtedness and pending the collection of assessments warrants may be issued against the district treasury, which warrants when registered in the district treasury draw interest at the rate of 7 per cent a year.

Bonds.

A district desiring to issue bonds for the purpose of acquiring water, water rights and irrigation works, submits plans therefor, together with estimates of cost, to the State Engineer. The plans are required to be prepared by a competent hydraulic engineer.

The State Engineer examines the plans, makes such additional surveys and investigations as he deems necessary and within 90 days must report his conclusions to the board of directors of the district.

He may recommend changes in the plans, and submits his estimate of the amount of bonds necessary to carry out the project under the plans as approved or modified by him.

In the light of the recommendations of the State Engineer, the board of directors determines the amount of bonds required, and so declares by resolution entered in the minutes of its meetings.

The report and recommendations of the State Engineer are advisory only, and may be ignored by the directors, who may determine according to their own ideas, how much bonds are required.

After the board has recorded its conclusions as to the amount of bond issue, a petition must be presented praying that an election be called upon the question of issuing bonds. The petition must be signed by the landowners representing a majority of the area of the district.

After due hearing upon the petition an election is ordered and if the vote is favorable by two-thirds voting therefor, the bonds are issued.

Bonds of an irrigation district may bear interest not exceeding 6 per cent a year. They are sold on competitive bids to the highest bidder.

Interest and principal of bonds are paid from taxes levied upon the lands.

No sinking fund is provided for the redemption of bonds, but in lieu of such a fund, the bonds are issued in series, and redeemed at specified times in progressively increasing percentages of the whole; as at 21 years after issuance 2 per cent are redeemed. In the 22d year, 2 per cent more. In the 23d and 24th years, 3 per cent each, and so on to the 39th and 40th years when 8 per cent of the principal each year is paid off and the debt canceled.

Some districts elect to begin paying off the bonds at an earlier date, depending upon the prospects for more or less rapid development of the district. It is considered poor economy to continue paying interest upon the whole issue after all the district has been brought under cultivation and the lands presumably have reached a paying basis.

Validation of bonds.

Prior to 1911, irrigation district bonds were not available for all purposes that other municipal bonds are, that is, they were not available for investments of trust funds, savings and insurance funds, state school funds, and could not be deposited with the State Treasurer as security for many purposes for which county, city or school district bonds are accepted.

In 1911 the legislature passed an act which was amended in 1913, providing that irrigation district bonds should be available for all the purposes named, *provided*, they bear a certificate of the State Controller reciting that they are available for those purposes, and that said bonds are entitled to said privileges by virtue of an examination made by a commission, composed of the State Engineer, State Superintendent of Banks and State Attorney General.

A district desiring to have its outstanding bonds or a contemplated issue made available for all the purposes named, by its board of directors applies to the commission to have its project examined for which the bonds are or will be issued.

The theory of the composition of the commission is that the State Engineer will pass upon the engineering features of the enterprise; the Attorney General upon the legality of all proceedings and validity of water rights, etc., and the Superintendent of Banks will ascertain the sufficiency of security offered by the district and the general safety of the bonds as an investment.

The Irrigation District Bond Commission upon request from a board of directors, proceeds to make a thorough investigation of the districts and its affairs and reports in writing with particular attention to the following matters:

(*a*) The supply of water available for the project and the right of the district to so much water as may be needed.

(*b*) The nature of the soil as to its fertility and susceptibility to irrigation, the probable amount of water needed for its irrigation, and the probable need of drainage.

(*c*) The feasibility of the district's irrigation system and of the specific project for which the bonds under consideration are desired or have been used, whether such system and project be constructed, projected or partially completed.

(*d*) The reasonable market value of the water, water rights, canals, reservoirs, reservoir sites and irrigation works owned by such district or to be acquired or constructed by it with the proceeds of any of such bonds.

(*e*) The reasonable market value of the lands included within the boundaries of the district.

(*f*) Whether or not the aggregate amount of the bonds under consideration and any other outstanding bonds of said district, including bonds authorized but not sold, exceeds sixty per centum of the aggregate market value of the lands within said district and of the water, water rights, canals, reservoirs, reservoir sites, and irrigation works owned, or to be acquired or constructed with the proceeds of any of said bonds, by said district, as determined in accordance with paragraphs (*d*) and (*e*) in this section.

(*g*) The numbers, date or dates of issue and denominations of the bonds, if any, which the commission shall find are available for the purposes provided for in section 7 of this act, and, if the investigation has covered contemplated bonds, the total amount of bonds which the district can issue without exceeding the limitation expressed in paragraph (*f*) of this section.

The written report of the commission is filed in the office of the State Controller and forms the basis for his certificate that the bonds of the district are available for the purposes enumerated.

During all construction work, to be paid for out of the proceeds of the sale of bonds, the district is required to make periodical reports of progress to the State Engineer.

The State Engineer may at any time make an examination of the affairs of any irrigation district, and make such report thereon as he may deem advisable.

The marked advance in the price offered for irrigation district bonds bearing the certificate of the State Controller is evidence that the safeguards afforded by the administration of the amendments just quoted is having the desired effect in the bond markets. The latest quotations have placed some district bonds above par which a few years ago were difficult to dispose of, even at a substantial discount.

Attention is invited to certain desirable amendations to the provisions of law as above set forth, which are here briefly discussed.

Upon the Board of Supervisors finding that a petition for the formation of a district conforms to the requirements, the State Engineer is notified and continuance ordered for a period not to exceed one month to receive his report as to the feasibility of the project.

If the State Engineer receives the notice of the board's action promptly and is prepared to enter upon the examination without delay a month is none too long a time when conditions are most favorable.

But sometimes several days elapse (in some instances three weeks or more) between the day of fixing the date to receive the report and the receipt by the State Engineer of the notice of the board's action.

It is not always possible to detach an employee of the department from work under way, and that circumstance may cause delay.

Frequently the proponents of a district have little or no reliable information bearing upon the project, and the investigation partakes of original research, and it is impossible in the time allotted to gather sufficient data, excepting in the simplest of cases, to enable the investigator to reach conclusions that will do justice either to himself or the project.

Furthermore, the authority of the investigations should go to fixing the boundaries of the district. It would seem to be a proper function of the Department of Engineering to make all necessary preliminary investigations for the proper initiation of proceedings to organize a district. Oftentimes proponents of a meritorious project are without data, and to obtain it imposes an unjust burden upon a few.

It is suggested that all engineering investigations for the state should be made by the Department of Engineering at the state's expense. There seems to be no objection, however, to having the district reimburse the state as soon as it becomes in a position to do so.

In the matter of a district issuing bonds, the plans of work proposed to be executed from the proceeds must be submitted to the State Engineer. His recommendations are purely advisory and may be accepted or rejected by the board of directors. This is not believed to be consistent with the mandatory provision that he *must* examine the plans prepared by the district.

Again: The law provides that during the construction of work to be paid for from the proceeds of bonds, copies of monthly reports made to the directors must be sent to the State Engineer. Many districts do not exact progress reports of construction, hence do not have copies to send.

The law declares that the State Engineer "may at any time make or cause to be made an examination of the affairs of any irrigation district or call upon the authorities of such district for such information as he may desire and make such report thereon as he may deem advisable." But it is not stated to whom he shall report nor is authority given to him or anyone else to correct matters which he finds need correction.

This department holds that when the state has given moral support to a district's bonds as it does by the certificate of the bond commission, it should have the power to supervise all work executed with the funds obtained from such bonds, and to enforce adherence to those plans upon which the commission based its approval, or, if the plans must be changed, such alteration should be approved by competent state authority.

New districts.

Since the date of the last report, to November 1, 1916, there have been 16 applications for authority to organize new irrigation districts. Twelve were favorably considered, two were not reported upon for lack of time to make the necessary investigations. One of these was organized under the provision that failure of the State Engineer to report shall not jeopardize or delay the organization of a district. The other failed of organization by adverse vote in the election.

Two proposed districts have been examined and proceedings are pending at the date of this writing, November 1st.

Five of the districts have submitted plans for approval upon which estimates of needed bonds were made. One district named in the former report has also submitted plans.

The following table gives information in detail concerning all districts receiving the attention of the State Engineer since the last biennial report:

TABLE No. 13.

Irrigation Districts Examined for Organization or Bond Issues, 1915-1916.

District	County	Date organized	Area, acres	Bonds authorized
Alpaugh	Tulare	Feb. 28, 1915	7,576	$283,000 00
Anderson-Cottonwood	Shasta	July 14, 1914	32,500	480,000 00
Cardiff	San Diego	Mar. 10, 1916	1,000	
Carmichael	Sacramento	Jan. 5, 1916	3,113	90,000 00
Honey Lake	Lassen	Aug. 29, 1916	31,000	
Jacinto	Glenn	Pending		
Lindsay-Strathmore	Tulare	Oct. 8, 1915	15,775	1,400,000 00
Paradise	Butte	Feb.	10,000	
Princeton-Cordova-Glenn	Glenn	Pending		
Southern Lassen	Lassen	Dec. 21, 1915	31,000	
Stratford	Kings	May, 1916	9,200	
Terra Bella	Tulare	Aug. 7, 1915	12,670	1,000,000 00
Waterford	Stanislaus		14,434	517,000 00
Webster	Madera	May, 1916	15,000	
Westside	San Joaquin	Aug., 1915	11,700	310,000 00

Bonds validated.

In the discussion of the relation of the Department of Engineering to irrigation districts, the operation of the bond validation act was described.

While an unvalidated bond, if issued by a sound district, may be as good an investment so far as concerns interest on the money it represents and the security for its ultimate payment as is a validated bond, nevertheless since the enactment of the validation act unvalidated bonds have little standing in the bond market.

During the two years past the Bond commission has received requests to pass upon the bonds of seven districts, two of which have been investigated and the bonds approved as follows:

TABLE No. 14.

Irrigation Districts Investigated and Bond Issues Approved by the Irrigation District Bond Commission.

Name of district	Area of district, acres	Amount of bonds approved	Value of all property	Per cent of bonds to property values
Imperial	512,000	$3,500,000	$40,000,000	8¾
Anderson-Cottonwood	32,500	480,000	1,900,000	25

The projects of Alpaugh, Carmichael, Lindsay-Strathmore, Terra Bella and Waterford districts are now being investigated by the Commission.

Waterworks districts.

In 1913 the legislature passed an act providing for the creation of county irrigation districts upon the same general lines as provided for the organization of irrigation districts excepting that the administration of the district is in the county authorities instead of local district officers. The Board of Supervisors of the county acts as a board of directors for the district.

In 1913 the legislature changed the title of these districts to county waterworks districts, and provided that bonds of such districts should be available for the same purposes as irrigation district and other bonds upon their being validated by a commission composed of the personnel of the irrigation district bond commission.

Three districts organized under this act have been investigated and their bonds approved as follows:

TABLE No. 15.

County Waterworks Districts Investigated and Bonds Approved by the County Waterworks Bond Commission.

Name of district	Area, acres	Amount of bonds	Value of property	Ratio of bonds to property values
Los Angeles County—				
Waterworks District No. 1	400	$30,000	$199,400	15
Waterworks District No. 2	143	15,000	60,000	25
Waterworks District No. 3	76,080	2,604,000	27,600,000	24½

All of these districts are in Los Angeles County. No. 1 embraces nearly all of the famous San Fernando Valley, which, since the district was organized, has been annexed to the city of Los Angeles, including nearly the whole district in the city limits.

The creation of this district affords a market for a large part of the surplus waters of the city brought from Owens River by the great Los Angeles aqueduct.

One of the other districts, No. 1, is located south of and adjoining the city while the other, No. 2, is in fact a municipal water supply organization for the village of Norwalk.

Needed legislation.

In order to give the state equal opportunity with private interests in ascertaining and promoting opportunities for economical irrigation development, and to assist communities desiring to form irrigation districts at the time or times assistance is most needed and hardest to pay for by community effort, this department, when deemed in the public interest, should have both the authority and the means to make surveys and investigations *of promising situations* of lands and water supplies available for community utilization. Data gathered in such surveys and investigations are of permanent value to the public and it is an unnecessary hardship to require communities to pay the cost of these initial engineering studies, and an unwarranted hindrance to progress to delay them until such time as the communities here become sufficiently organized to pay their cost.

Although the amendments to the irrigation district law enacted at recent sessions of the legislature have greatly strengthened the districts working under them, experience points to several desirable changes to which it is desired to call attention.

1. Before a petition for the formation of a district is presented to the Board of Supervisors, the State Engineer should be called in to make investigations.

He should be given funds with which to conduct examination not only into the water supply but also into the nature of the soils as to their adaptability to irrigation and whether the cost will or will not be greater than the lands can bear. He should have authority to decide upon the exclusion or inclusion of lands. He should also be given time commensurate with the magnitude of the project and the difficulties encountered in which to make the investigations and report, and finally his report should not be lightly set aside or ignored.

When the district organization is completed, and funds are available the cost of the investigation might be returned to the state, but in case the report of the State Engineer should be adverse to the project or for other reasons it should fail to complete organization, then the state should stand the loss.

2. Under the present law a district may be formed consisting of many tracts of land not joining or not necessarily contiguous. After a district is organized, however, lands outside the boundaries may be included upon petition, but only if they are contiguous.

If the supply of water is more than sufficient for the needs of the district any lands susceptible of irrigation from the district's water should be annexed on petition, even though not "contiguous."

3. There should be some provision for the consolidation of two or more districts when their interests would be benefited thereby. Instances are known where if two adjoining districts were under one management, the use of the water in times of scarcity could be alternated with benefit to both.

At least one instance is called to mind where it seems doubtful if either of two districts will be able to finance separate projects, while if they were united they could probably find means to construct one system to serve the lands of both.

4. The State Engineer is required to examine the plans and estimates for the construction of works for which it is contemplated to issue

bonds; but his report and recommendations are advisory only and the district may ignore them entirely. Although the law directs that progress of construction shall be reported to the State Engineer periodically, no authority is vested anywhere to compel a compliance with the law. He is authorized to examine work in progress but not empowered to stop that work or change it if he finds it is not being executed according to the plans approved. He is given no funds with which to pay the expense of inspection and examination.

His report on the plans should be binding. He should be able to exercise close supervision of the work and have power to enforce compliance with the plans.

It is not contended here that the permission of organizing a district should rest in the judgment of the State Engineer alone. On the contrary it might be better to submit the questions of area, of boundaries, of inclusion or exclusion of lands, and the general industrial feasibility of the proposed district to a state land commission or irrigation board, leaving the research work—the gathering of physical data—to the Department of Engineering.

Likewise the enforcement of police regulations governing construction according to the plans might be delegated to another body, the department furnishing the engineering knowledge and skill necessary for intelligent supervision and direction.

These matters are commended for the consideration of the coming legislature.

COOPERATIVE RESEARCH.

The state of California since 1903 has been cooperating with different branches of the national government in prosecuting investigations and studies of her natural resources. Appropriations are made at each session of the legislature and in pursuance of the acts, agreements are entered into between the State Engineer in behalf of the state, and representatives of the government for cooperative research, and allotments made of the funds appropriated to cover the state's portion of the expense of making the investigations.

The agreements made during the biennium just closing are as follows:

With the Director of the United States Geological Survey, for:

Topographic surveys.
Water resources investigations.

With the Department of Agriculture, Office of Public Roads and Rural Engineering, for:

Irrigation and drainage investigations.

These agreements are made to run only one year and are renewed annually.

The gathering of the information included in the above subjects is very properly a function of the Department of Engineering, but to provide the department with the requisite equipment for field and laboratory work to maintain the necessary working force, would require a large appropriation. Furthermore, the work accomplished by the department, acting alone, would be duplicate of a great deal that has been done before and that would follow in the regular progress of the work of the other governmental investigators.

By these cooperative arrangements the state obtains the service of already organized corps of experienced investigators possessing all the best apparatus and instruments, and for their service the state is required to pay only a portion of the operating expenses. The appropriations made by the congress for the matters under discussion are too small to permit of any great amount of work being accomplished in any one state, but it is the policy of the government to give preference to those states which desire to cooperate, and the practice is to allot an amount equal to the state's appropriation.

It should be borne in mind that, in addition to the many advantages resulting from cooperative work, all money appropriated by the state is met by a like amount from the federal treasury and nearly every dollar is expended within the state.

TOPOGRAPHIC SURVEYS.

The character of the cooperative topographic surveys made in accordance with the agreement with the Director of the United States Geological Survey is summarized as follows:

The order in which the field work is prosecuted in different parts of the state is fixed by agreement from time to time as the work progresses. The surveys are executed in a manner sufficiently elaborate to prepare maps upon scales which are agreed upon for different localities, and exhibit the hydrography, hypsography, public culture, and all public land and county boundary lines which are marked upon the ground.

The information secured by the surveys is published in atlas sheets of convenient size, called quadrangles. The sheets of paper are 20 x 16.5 inches in dimensions, the territory embraced in each quadrangle covering 15 minutes, 30 minutes, or one degree of latitude, and the same of longitude, according to the scale of the publication. Three scales are employed. The largest scale used in standard sheets is 1:62500, corresponding very nearly to one mile to one inch. Maps drawn on this scale are those of thickly-settled communities or industrially important sections of the country. An intermediate scale of 1:125000, or about two miles to the inch, is employed for the greater part of the country, while the smallest scale, 1:250000, or about four miles to the inch, is used for territory of relatively slight industrial importance or sparse population, such as the desert regions. A few special maps of important mining districts or other limited areas are issued on special scales suited to the requirements of the country mapped, when sheets are designated by name, usually that of some important physical feature, thus: Yuba City quadrangle, Pyramid Peak quadrangle, etc. That portion of the Sacramento Valley lying west of the Sacramento River has been published in sheets 28 x 40 inches and covering several quadrangles, the scale being 1:31680, or one-half mile to the inch. These are found very convenient in studying irrigation and reclamation in these regions where projects embrace large areas.

The maps are sufficiently detailed to serve as base maps on which are represented the character of the soils and forests of the area surveyed, and show all principal objects, natural or artificial, such as streams, lakes, shore lines, reservoirs, canals, important wells, springs, railroads, highways, power-transmission lines, principal houses, villages, towns, and cities, quarries, mills and other industrial plants, all with great clearness and fidelity to position.

The hypsography is shown by contour lines with vertical intervals of five to 100 feet, according to the smoothness or ruggedness of the terrene. The heights of important points are determined and enduring monuments and bench marks are established, the elevation and location of which are found by precise methods. Along both sides of the Sacramento River, from Suisun Bay to a point several miles above the city of Sacramento, there have been set solid concrete monuments, in which are imbedded aluminum tablets upon which are marked the elevations to the nearest foot. At frequent intervals all over the territory surveyed are placed other bench marks which consist of iron pipes set solidly in the ground and capped with a bronze or aluminum cap, marked in the same manner as the tablets on the concrete monuments. A record of the location, and the elevation in feet and fractions, of all bench marks is kept on file in the office of this department. All elevations noted by the survey are determined by precise level lines run and checked with the utmost care, and are referred to mean sea level as deduced from long series of observations.

The United States Geological Survey conducted topographic surveys in 30 states and one territory during the fiscal year ending June 30. 1914, and mapped 19,230 square miles of territory. The total area of the country now mapped amounts to 40.9 per cent of the entire area of the continental United States and 22 per cent of Hawaii.

In California there were 5,793 square miles surveyed during the biennial period ending June 30, 1916. The total area now mapped amounts to about 74 per cent of the entire surface of the state. The surveys were made by the United States Geological Survey, acting alone or in cooperation with the state of California.

The Survey, independently of cooperative assistance, completed the survey and mapped the following: Seiad, Sawyer's Bar, Preston, Cholame and White Mountain, 30-minute quadrangles; San Juan Bautista, Morgan Hill, Point Reyes and New Almaden, 15-minute quadrangles. The resurvey of Mare Island and revision of portions of San Francisco, Concord, Hayward and Alameda quadrangles were completed.

In cooperation with the University of California, the survey of Santa Rosa quadrangle was completed and the map has been published. In cooperation with the city of Los Angeles, the Elizabeth Lake quadrangle and part of the Kramer quadrangle were surveyed and mapped. The result of those surveys was embodied by the city in a very complete relief map of the Los Angeles aqueduct.

Those quadrangles surveyed in cooperation with the Department of Engineering are enumerated in the report at the end of this article.

All of the quadrangle maps of the Sacramento Valley are now published.

Special effort has been put upon the survey of the San Joaquin Valley in response to the need for the data in studies of irrigation, reclamation and flood control problems.

In the San Joaquin Valley the topographic survey at the close of June, 1914, had covered about 1,180 square miles. For the period ending June 30, 1916, the survey was extended over nearly 1,600 square miles, making the total area of the valley now surveyed and mapped about 2,680 square miles.

In addition to the 1,600 square miles mapped, 109 triangulation stations were occupied, 92 stations marked and 183 miles of primary levels run with 47 permanent bench marks established.

In two instances the topographic surveys were extended ahead of the regular progress in order to cover special areas for study of irrigation and flood control urgently needed.

The cooperative topographic surveys have been conducted under the supervision of Mr. George R. Davis, geographer in charge of the Pacific division, directed by Mr. R. B. Marshall, chief geographer, and W. H. Herron, acting chief geographer.

Their report in detail for the two years ending June 30, 1914, follows:

Report of topographic surveys in cooperation between the United States Geological Survey and the state of California, for the fiscal years beginning July 1, 1914, and ending June 30, 1916.

In accordance with the cooperative agreements signed August 8, 1914, and June 24, 1915, by George Otis Smith, Director, for the United States Geological Survey, and August 26, 1914, and June 29, 1915, by W. F. McClure, State Engineer, for the state of California, the Federal Survey allotted $14,000 each year, and the state an equal amount, for cooperative topographic surveys in the state of California for the fiscal years ending June 30, 1915, and June 30, 1916.

The following is a summary of the field and office work accomplished during the above period under the general direction of R. B. Marshall, chief geographer, W. H. Herron, acting chief geographer, and under the immediate supervision of George R. Davis, geographer in charge of the Pacific division:

FIELD WORK.

Quadrangles	Counties	Publication scale	Area mapped, sq. miles	Primary Levels		Secondary traverse, miles	Triangulation	
				Miles	Perm. marks		Station occupied	Station marked
Denair	Stanislaus	1:31,680	47	--------	--------	--------	--------	--------
Cressey	Stanislaus Merced.	1:31,680	59	--------	--------	--------	--------	--------
Ceres	Stanislaus	1:31,680	59	--------	--------	--------	--------	--------
Crows Landing	Stanislaus Merced.	1:31,680	59	--------	--------	--------	1	--------
Mitchell School	Stanislaus Merced.	1:31,680	59	--------	--------	--------	1	--------
Winton	Merced	1:31,680	59	--------	--------	--------	--------	--------
Minturn	Madera Merced.	1:31,680	--------	--------	--------	--------	1	--------
Merced	Merced	1:31,680	60	--------	--------	--------	2	--------
Hopeton	Merced	1:31,680	59	--------	--------	--------	--------	--------
Turlock	Merced	1:31,680	59	--------	--------	--------	1	1
Copperopolis	Calaveras Stanislaus. Tuolumne.	1:62,500	158	7	1	--------	--------	--------
Stevinson	Merced	1:31,680	60	--------	--------	--------	3	2
No. 7	Mariposa Merced.	1:31,680	59	11	3	--------	1	--------
Arena	Merced	1:31,680	59	--------	--------	--------	5	5
No. 9	Mariposa Merced. Madera.	1:31,680	59	10	3	--------	--------	2
LeGrand	Madera Mariposa. Merced.	1:31.680	59	6	3	--------	--------	2
Gustine	Merced Stanislaus.	1:31,680	60	--------	--------	--------	4	--------
Planada	Merced	1:31,680	60	10	1	--------	1	--------
Plainsburg	Madera Merced.	1:31,680	34	6	1	--------	1	--------
Atwater	Merced	1:31,680	60	--------	--------	--------	--------	--------
Newman	Merced Stanislaus.	1:31,680	60	--------	--------	--------	1	--------
Ingomar	Merced	1:31,680	59	--------	--------	--------	1	1
No. 74	Mariposa Merced.	1:31,680	37	8	3	--------	--------	--------
Las Garzas Creek	Merced Stanislaus.	1:31,680	55	14	4	--------	1	--------
Indian Gulch	Mariposa Merced.	1:62,500	90	11	3	--------	5	3
Snelling	Merced Stanislaus.	1.31,680	59	7	2	--------	--------	--------
Merced Falls	Mariposa Merced.	1:31,680	14	4	1	--------	--------	--------
La Grange	Merced Stanislaus. Tuolumne.	1:31,680	16	2	1	--------	--------	--------

FIELD WORK—Continued.

Quadrangles	Counties	Publication scale	Area mapped, sq. miles	Primary Levels		Secondary traverse, miles	Triangulation	
				Miles	Perm. marks		Station occupied	Station marked
Orestimba Creek	Stanislaus	1:31680	19	--------	--------	--------	--------	--------
No. 10	Merced Madera.	--------	--------	2	1	--------	4	4
Deadman Creek	Merced	--------	--------	8	2	--------	1	1
Kearney Peak	Fresno	--------	--------	--------	--------	--------	3	2
Jesbel	Madera Mariposa.	--------	--------	--------	--------	--------	1	1
Clovis	Fresno Madera.	--------	--------	--------	--------	--------	1	--------
Chowchilla Slough	Merced	--------	--------	--------	--------	--------	3	5
Berendo	Madera	--------	--------	4	1	--------	1	3
Fresno	Fresno	--------	--------	--------	--------	--------	3	1
Friant	Fresno Madera.	--------	--------	--------	--------	--------	1	--------
Herndon	Fresno Madera.	--------	--------	--------	--------	--------	1	--------
Sharon	Madera	--------	--------	10	2	--------	1	1
Madera	Madera	--------	--------	3	1	--------	3	--------
Bridge	Fresno Madera.	--------	--------	--------	--------	--------	2	2
No. 15	Madera	--------	--------	--------	--------	--------	3	4
No. 16	Madera	--------	--------	--------	--------	--------	5	--------
No. 17	Madera	--------	--------	--------	--------	--------	2	--------
No. 19	Madera San Joaquin.	--------	--------	--------	--------	--------	1	3
No. 20	Fresno Madera.	--------	--------	--------	--------	--------	4	3
No. 21	Fresno Madera.	--------	--------	--------	--------	--------	1	1
San Luis Creek	Merced	--------	--------	11	3	--------	1	--------
Mariposa Slough	Merced	--------	--------	3	--------	--------	2	--------
Salt Slough	Merced	--------	--------	--------	--------	--------	2	2
Volta	Merced	--------	--------	14	3	--------	1	1
Los Banos	Merced	--------	--------	3	--------	--------	2	--------
Center School	Merced	--------	--------	--------	--------	--------	2	--------
Daulton	Madera	--------	--------	14	4	--------	1	--------
Trigo	San Joaquin Stanislaus.	--------	--------	2	--------	--------	--------	--------
Bachelor Valley	Calaveras Stanislaus.	--------	--------	13	4	--------	--------	--------
Elgin	Merced	--------	--------	--------	--------	--------	4	4
No. 14	Fresno Madera.	--------	--------	--------	--------	--------	1	1
No. 18	Fresno	--------	--------	--------	--------	--------	1	2
No. 22	Fresno	--------	--------	--------	--------	--------	--------	1
No. 23	Fresno	--------	--------	--------	--------	--------	2	2
No. 24	Madera	--------	--------	--------	--------	--------	1	--------
No. 25	Madera	--------	--------	--------	--------	--------	1	2
Kerman	Fresno	--------	--------	--------	--------	--------	2	2
Kings River	Fresno	--------	--------	--------	--------	--------	--------	2
Dos Palos	Madera Merced.	--------	--------	--------	--------	--------	4	3
Oxalis	Madera Merced. Fresno.	--------	--------	--------	--------	--------	2	3
Firebaugh	Fresno Madera.	--------	--------	--------	--------	--------	1	2
Mendota	Fresno Madera.	--------	--------	--------	--------	--------	1	4
Sheep Ranch	Fresno	--------	--------	--------	--------	--------	2	--------
Reedley Special	Fresno	--------	--------	--------	--------	--------	--------	1
San Joaquin	Madera	--------	--------	--------	--------	--------	1	1
Sanger	Fresno	--------	--------	--------	--------	--------	--------	2
Wahtoke	Fresno	--------	--------	--------	--------	--------	--------	1
Sultana	Fresno Tulare.	--------	--------	--------	--------	--------	--------	1
Jamison	Fresno	--------	--------	--------	--------	--------	3	5
Tranquillity	Fresno	--------	--------	--------	--------	--------	2	3
Totals	--------	--------	1,597	183	47	--------	109	92

The following members of the topographic branch were engaged in the field work:

Topographic Mapping:

- A. O. Burkland, topographer
- H. W. Peabody, assistant topographer
- A. J. Ogle, assistant topographer
- J. B. Leavitt, assistant topographer
- S. H. Birdseye, assistant topographer
- F. A. Danforth, assistant topographer
- C. A. Stonesifer, junior topographer
- E. P. Davis, topographer
- R. T. Evans, topographer
- J. H. LeFeaver, assistant topographer
- N. E. Ballmer, assistant topographer
- Roscoe Reeves, assistant topographer
- R. M. Wilson, junior topographer

Triangulation:

- C. L. Nelson, topographic engineer
- C. F. Urquhart, topographic engineer
- L. F. Biggs, topographer

Primary Levels:

- Roscoe Reeves, assistant topographer
- D. S. Birkett, assistant topographer

Office Work. The office drafting of the Ceres, Copperopolis, Cressey, Crows Landing, Denair, Riverbank, Klamath River, Merced, Mitchell School, Hopeton, Scott River, Stanislaus River, Turlock, Waterford, Winton, Arena, Atwater, Gustine, Newman, Orestimba Creek, Owens Creek, Planada, Snelling and Stevinson topographic maps was completed and the maps transmitted for engraving. The drafting of the Le Grand and Lagrange topographic maps was each five per cent completed.

Primary level circuits were adjusted for the Copperopolis quadrangle and for the San Joaquin Valley and the results typewritten for publication.

Geographic positions were computed for the Mitchell School, Turlock, Cressey, Winton, Hopeton, Stevinson, No. 8, Atwater, Merced, Planada, Mariposa Slough, Owens Creek, No. 11, Indian Gulch, Plainsburg, Le Grand, No. 9, Deadman Creek, Chowchilla Slough, Salt Slough, Ingomar, Las Garzas Creek, Berenda, Minturn, and No. 10 quadrangles.

WATER RESOURCES.

Investigation, measurement and cataloging of the water resources of the state have been diligently prosecuted for many years by private interests seeking to take advantage of the loose laws to appropriate the waters to private exploitation.

It was not until recent years that the public awoke to the fact that the vast resources of the state, residing in the potential waters of its rivers, brooks and waterfalls; its lakes and glaciers, were fast passing to private ownership, and interposed a staying hand by enacting the conservation laws of 1911.

The government had been engaged in a small way in gathering data as to stream flow, but not until cooperation was established with the state did this character of research assume a degree of activity at all in keeping with its importance to the public.

When the Department of Engineering was created and entrusted with the task of representing the state in these matters, the work of gathering information began to expand, and by 1909 there were 70 gaging stations established on the streams of the state. That was not many when the extent of territory and mileage of stream is considered, but by cooperating and uniting the funds of state and nation the work was prosecuted and data began to accumulate.

Since 1911 there have been about 300 gaging stations established. Some of these were maintained but a short time, while others have been constantly maintained and the records obtained show the quantity of water flowing every day of the year.

Records of stream flow are highly important, in fact absolutely necessary, in devising projects for irrigation, reclamation, flood control, power development, and navigation, or in fact any use to which flowing water may be devoted. The lack of complete records is keenly felt by the Department of Engineering and all others in attempting to solve the many problems of hydroeconomics so vital to the prosperity of the state.

At the close of June last there were 160 gaging stations in operation distributed as far as practicable so as to give the greatest value to the entire state. Wherever great interests are involved extra effort is put forth to obtain data. Several new stations have been established in the Tuolumne drainage basin in cooperation with the city of San Francisco in studies of the Hetch Hetchy project.

The city of Los Angeles has cooperated and enabled more extensive measurements to be made of the stream flow in Owens River basin.

Intensive study has been given to the hydrography of San Diego County, the results of which will soon be published. The unprecedented floods in that region early in 1916 played havoc with the gaging stations, many of which were completely washed away and the conditions so changed that they had to be abandoned or new locations found. The loss in equipment alone amounted to about $2,600.

More extensive studies have been made of the run-off and flood conditions affecting the regions about Los Angeles, due to cooperation of the Forest Service and the county officials.

Much additional data has been obtained concerning Merced River through the assistance of the Bureau of Parks of the Interior Department.

The work of stream measurement has also been much assisted by funds furnished by the State Water Commission.

The accuracy of the data obtained has been greatly improved. The number of stations equipped with automatic registering apparatus is being constantly augmented, as funds will permit. All important stations should be so equipped and the instruments housed in permanent structures.

METHODS OF STREAM MEASUREMENT.

To ascertain the quantity of water flowing at a given point the cross section of the stream is carefully measured, the measurements referred or "tied" to some permanent monument or mark established nearby, where it is safe from disturbance.

A graduated rod or staff is set up marked in feet and subdivisions, and with the zero generally at the surface of the water, or if it can be ascertained, at the height of the lowest low water known.

At important stations, particularly if the stream is subject to frequent fluctuations, and in locations where observers can not frequently visit the station, automatic gages are installed, which indicate every variation in the height of water and make a continuous record of it on paper. The mechanism of the automatic gages is operated by clockwork and the records are usually arranged to cover a week, at the end of which time a new sheet must be put in and the clock rewound. These gages are delicate instruments and must be well protected from the weather as well as from vandalism of chance passers-by.

Measurements of the velocity of the flowing water are taken at intervals, effort being made to obtain such measurements at different stages of the water as will obtain data for calculating the rate of flow at all stages. This is called rating the station and a table of the flow for each fraction of a foot in height, shown on the gage, is prepared from these measurements and calculations, which computation is called a "rating table."

Several methods are used to measure the quantity of water flowing in the streams, as by obtaining the depth flowing over a dam or weir, or by measuring the velocity of the current with a current meter, or in some instances by chemical analysis.

The weir method is preferred where conditions make it reliable. The chemical method is considered very efficient, but has not become well known.

The current meter method is the one generally used, and by permission of the Director of the United States Geological Survey illustrations of the instruments used and their method of employment are herewith presented.

The several methods employed are fully described in the publications of the Survey, particularly in "Weir experiments, coefficients and formulas," designated as Water Supply Paper 200; "Turbine water wheel tests and power tables," as Water Supply Paper 180; and "Surface water supply of the United States 1907–8. Part IX," Water Supply Paper 251. These volumes may be purchased at a nominal price from the Superintendent of Documents, Washington, D. C.

The results of stream measurements are expressed in second-feet or acre-feet. A second-foot is the prism of water one foot deep, one foot wide and moving a foot of distance in a second of time. A stream flowing a second-foot, or as it is sometimes written, a cubic foot per second, would fill a box a foot square and a foot deep every second, and amounts to 448.8 gallons a minute. In ordinary practice it is regarded as 450 gallons a minute.

An acre-foot of water is the quantity that would cover an acre of space one foot in depth, and amounts to 43,560 cubic feet.

One second-foot of water, running continuously for twenty-four hours, will cover an acre to a depth of 1.98 feet or amount to 1.98 acre-feet. For many computations it is sufficiently accurate to assume a second-foot to be equivalent to two acre-feet a day.

In California and some other states another unit of measurement is used, called the miner's inch. This is, theoretically, the quantity of water that will flow through an orifice one inch square, placed at a certain distance below the surface. The depth below the surface, called the "head," varies in different states and in different localities in the same state.

The statutes of California require an appropriator to describe the extent of his appropriation, stating the quantity he claims "in inches, measured under a four inch pressure." Hydraulicians are agreed that pressure means "head" which is the vertical distance from the surface of still water to the center of gravity of the orifice. Under such conditions a miner's inch would be equivalent to 0.02 (one-fiftieth) second-foot or, in round numbers, nine gallons a minute.

By a statute enacted in 1903, however, it is declared that a miner's inch shall be equivalent to one-fortieth second-foot, or 11.25 gallons a minute, and the statute of 1913, defining the powers of the State Water Commission, directs that an inch of water shall be equivalent to one-fortieth of a second-foot.

These contradictory provisions should be repealed, and one enacted requiring all quantities to be described with definite figures; gallons per minute for domestic use or pumping, second-feet for rate of flow and acre-feet for quantity.

The results of the observations at the gaging stations established at various points on the streams of the state are published from time to time in the bulletins issued by the Geological Survey under the title of Water Supply Papers.

These published records give the following information:

Description of station, and of its characteristics.
List of discharge measurements made on the stream above.
Table of daily gage heights at the station.
Table of daily discharges.
Table of monthly and yearly discharges and run-off.

The records obtained are of inestimable value in the study of the many problems concerning irrigation, reclamation, flood control and navigation, and have been accepted and used very extensively by engineers engaged in operations under either and all of the subjects named.

The records obtained of the flow of Sacramento River and its tributaries were also used by the United States Debris Commission and the Board of Engineers for Rivers and Harbors as a basis for the plan reported to congress for the "Control of Floods in the Systems of the Sacramento Valley and the adjacent San Joaquin Valley," a project involving the expenditure of millions of dollars.

A similar project for the same purpose was proposed several years ago, before the cooperative observations above mentioned had procured complete data. The project was based upon the best information obtainable at that time of the flood flow of the streams, but in the light of later research and from the continuous records obtained, it is known that works for flood control must care for about 130 per cent more water than was formerly believed to be necessary.

A reliable record, then, of the quantity of water poured into the valley by all its streams at flood is necessary to an intelligent study of problems relating to flood control. A knowledge of the amount of low water flow is requisite in discussing means of aiding navigation.

Correct information as to the daily, monthly and annual flow of each stream, and of all combined, is necessary in exploiting irrigation enterprises for the 10,000,000 acres of irrigable land in the Great Valley, and other millions of acres elsewhere in the state.

In furtherance of this last-named object, knowledge is required, too, of the extent to which surplus water can be conserved, and the flow regulated by storage reservoirs.

One of the great assets of the state is nature's storage reservoirs in the vast snow fields at the head of the streams, and yet not one iota of information is collected concerning their condition.

A record of the depth and quantity of water contained in every artificial reservoir for each day is obtainable, but never an effort to ascertain the quantity stored in the snow banks.

It is known from the stream flow records at the end of the season how much water has come down, but if reliable records were systematically made every season of the snow lying in the drainage basins, after a few years rating tables would be devised by which observations in the snow fields would indicate in advance the discharge to be expected for the coming season.

It is not enough that merely the depth of the snow be reported, as that conveys little information, but what it is desired to know is the water content of the snow. After a given basin has been well surveyed, a few typical locations may be selected for observation representing average conditions, the results from which will enable a close estimate to be made of the quantity of water that will arrive at the gaging stations below.

Such information would be valuable to all having to do with any of the uses of water, but it is particularly desirable in operating reservoirs which might be created for the combined purposes of flood control and irrigation. With a knowledge of the amount of water in storage in the snows, the probable flood flows may be forecast and the proper time be determined when the irrigation water may begin to be stored.

The importance of this subject is so apparent to those of the department who are engaged in studying hydroeconomics that it is urged upon the legislature to give it substantial recognition by an appropriation which will enable this line of research to be entered upon at once and vigorously prosecuted.

The investigations into the water resources of the state by the United States Geological Survey in cooperation with the state of California during the last biennial period have been conducted under the charge of Mr. N. C. Grover, chief hydraulic engineer, chief of the water resources branch, United States Geological Survey, by Mr. H. D. McGlashan, district engineer, whose report will be found at the close of this article.

REPORT TO THE DEPARTMENT OF ENGINEERING ON THE PROGRESS OF THE SURFACE WATER INVESTIGATIONS IN CALIFORNIA BY THE WATER RESOURCES BRANCH OF THE UNITED STATES GEOLOGICAL SURVEY FOR 1914-1916.

By N. C. GROVER, Chief Hydraulic Engineer, and H. D. McGLASHAN, District Engineer.

The investigations in this state during the past two years have been, in general, a continuation of the work outlined in your Fourth Biennial Report. The regular stream-gaging fund provided by the federal government and the state of California, through your department, has been augmented by the appropriations of the State Water Commission. As the money available has been sufficient to maintain only the work under way at the time of the last report, no particular extension has been practicable. It has been necessary to abandon a few of the less important gaging stations, either on account of unfavorable natural conditions or a withdrawal of cooperation, and a small number of new stations have been established. As far as practicable, the work has been so apportioned that it will result in the greatest possible value to the entire state. There are still many points in all portions of the state where additional stream-flow records are greatly needed. The demand for such records can not be met unless the appropriations for the work are increased.

The table which follows shows the gaging stations maintained during the two-year period ending November, 1916. These stations are distributed among major drainage basins as follows: North Pacific, 8 per cent; South Pacific, 27 per cent; Sacramento, 18 per cent; San Joaquin, 34 per cent; Great Basin, 13 per cent.

Stream.	Post Office.
Agua Caliente Creek†	Warner Springs
American River	Fairoaks
American River (Middle Fork)	East Auburn
American River (South Fork)	Placerville
American River (North Fork)	Colfax
Arroyo Seco	Soledad

Stream.	Post Office.
Arroyo Seco	Pasadena
Baxter Creek†	Janesville
Bear Creek	Springville
Bear River	Van Trent
Bear River	Colfax
Bear River Canal	Colfax
Big Creek	Shaver
Big Creek†	Tollhouse
Black Canyon Creek†	Mesa Grande
Boulder Creek (mouth)†	Lakeside
Boulder Creek (Cuyamaca reservoir)	Lakeside
Buckeye	Bridgeport
Butte Creek	Butte Valley
Cache Creek†	Lower Lake
Cache Creek	Yolo
Calaveras River	Jenny Lind
Canada Verde River†	Warner Springs
Carrizo Creek†	Warner Springs
Carson River (West Fork)	Woodfords
Carson River (East Fork)	Markleeville
Cherry Creek	Sequoia
Clavey River†	Tuolumne
Clear Lake	Lakeport
Clear Creek†	Shasta
Coffee Creek†	Coffee
Cosumnes River	Michigan Bar
Cosumnes River (North Fork)	El Dorado
Cottonwood Creek	Dulzura
Crane Valley reservoir	North Fork
Deer Creek	Hot Springs
Deer Creek†	Vina
Dinkey Creek†	Ockenden
Donner Creek†	Truckee
East Walker River	Bridgeport
Eel River	Scotia
Eleanor Creek	Sequoia
Elsinore Lake	Elsinore
Erskine Creek†	Bodfish
Escondido Mutual Water Co.'s canal	Nellie
Falls Creek	Sequoia
Feather Creek	Oroville
Feather River (Middle Fork)	Oroville
Feather River (Middle Fork)	Cromberg
Feather River (North Fork)†	Prattville
Feather River (North Fork) at Big Bar, near	Oroville
Feather River (South Fork)	Enterprise
Fish Creek	Duarte
Fresno River	Knowles
Fresno Flume & Lumber Co.'s flume	Shaver
Gobernador Creek	Carpinteria
Golden Rock ditch	Sequoia
Gold Run Creek†	Susanville
Goodyear Creek	Goodyear Bar
Hat Creek	Hat Creek
Illilouette Creek†	Yosemite
Indian Creek	Crescent Mills
Indian Creek	Happy Camp
Janesville Creek†	Janesville
Jawbone Creek†	Tuolumne
Kaweah River	Three Rivers
Kaweah River (North Fork) at	Kaweah
Kaweah River (South Fork)	Three Rivers
Kaweah River (East Fork)†	Hammond
Kaweah River (Marble Fork)†	Ranger
Kaweah River (Middle Fork)†	Hammond
Kaweah River (North Fork)† near	Kaweah
Kern River	Bakersfield
Kern River	Kernville
Kern River power canal	Isabella
Kings River	Sanger
Kings River (North Fork)†	Ockenden
Klamath River	Requa
Klamath River	Seiad Valley
Kosk Creek	Henderson
Lake Tahoe	Tahoe

Stream.	Post Office.
Lassen Creek†	Johnstonville
Leevining Creek†	Mono Lake
Little Anita Creek	Sierra Madre
Little Stony Creek	Lodoga
Little Truckee River†	Boca
Lytle Creek	San Bernardino
Markleeville Creek, above	Markleeville
Markleeville Creek, at	Markleeville
Matagual Creek†	Warner Springs
McCloud River	Baird
Merced River	Exchequer
Merced River	Yosemite
Merced River at power house	Yosemite
Merced River above Illilouette Creek†	Yosemite
Merced River (South Fork)	Wawona
Middle Eel River	Covelo
Mill Creek	Forest Home
Modesto Canal	Lagrange
Mokelumne River	Clements
Mokelumne River (Licking Fork)	Railroad Flat
Mokelumne River (Middle Fork)	West Point
Mokelumne River (South Fork)	Railroad Flat
Mono Lake	Mono Lake
Monrovia pipe line	Monrovia
Oakdale canal	Knights Ferry
Oregon Creek	North San Juan
Owens Lake	Lone Pine
Owens River	Lone Pine
Owens River	Round Valley
Owens River	Tinemaha
Pacific Light & Power Co.'s canal	Azusa
Pacific Light & Power Co.'s canal	Mentone
Palermo Land & Water Co.'s canal	Enterprise
Pine Creek	Round Valley
Pit River	Henderson
Pit River	Ydalpom
Pitman Creek	Shaver
Putah Creek	Winters
Reeve Davis Con. Mining Co.'s flume	Happy Camp
Relief Creek	Avery
Robinson Creek	Bridgeport
Rock Creek	Goodyear Bar
Rock Creek	Round Valley
Rush Creek†	Mono Lake
Sacramento River	Castella
Sacramento River	Red Bluff
Salmon River†	Somesbar
Salton Sea	Salton
San Antonio Creek	Upland
San Diego River†	Lakeside
San Diego Flume	Lakeside
San Diego River	San Diego
San Diego River	Santee
San Diego River (at diverting dam)	Lakeside
San Diego Flume (at diverting dam)	Lakeside
San Diego River (South Fork)†	Alpine
San Diego River (South Fork) flume†	Alpine
San Dieguito River†	Bernardo
San Dieguito River (at Carroll dam site)	Bernardo
San Dieguito River†	Del Mar
San Gabriel River	Azusa
San Gabriel River (headworks)†	Azusa
San Jacinto River	Elsinore
San Joaquin River	Friant
San Joaquin River	Newman
San Joaquin River	North Fork
San Luis Rey River†	Bonsall
San Luis Rey River	Mesa Grande
San Luis Rey River	Nellie
San Luis Rey River†	Oceanside
San Luis Rey River	Pala
San Luis Rey River†	Warner Springs
San Luis Rey River (West Fork)†	Warner Springs
San Vicente Creek†	Foster
Santa Ana River	Mentone

Stream.	Post Office.
Santa Maria River	Ramona
Santa Ynez River	Lompoc
Santa Ynez River	Santa Barbara
Santa Ynez River†	Solvang
Santa Ysabel Creek	Ramona
Santa Ysabel Creek	Mesa Grande
Santa Ysabel Creek†	Santa Ysabel
Schloss Creek†	Lassen
Scott River	Callahan
Scott River (East Fork)	Callahan
Shasta River	Montague
Smith River (Middle Fork)	Crescent City
Smith River (North Fork)	Crescent City
South Fork Creek	North Fork
South San Joaquin canal	Knights Ferry
Spanish Creek	Keddie
Stanislaus River†	Knights Ferry
Stanislaus River (above Goodwin dam)	Knights Ferry
Stanislaus River (Middle Fork)	Avery
Stanislaus River (North Fork)	Avery
Stanislaus River (South Fork)	Confidence
Stevensen Creek	Shaver
Susanna Creek†	Warner Springs
Swager Creek	Bridgeport
Sweetwater River	Dehesa
Sweetwater River	Descanso
Swift Creek†	Trinity Center
Temescal Creek†	Almond
Temescal Creek	Elsinore
Tenaya Creek	Yosemite
Trinity River	Hoopa
Trinity River	Lewiston
Trinity River†	Trinity Center
Trinity River (East Fork)†	Trinity Center
Truckee River	Iceland
Truckee River	Tahoe
Tulare Lake	Stratford
Tule River	Porterville
Tule River (South Fork)	Porterville
Tule River (North Fork of Middle Fork)†	Springville
Tule River (South Fork of Middle Fork)†	Springville
Tuolumne River	Lagrange
Tuolumne River (above Lagrange Dam)	Lagrange
Tuolumne River (at Hetch Hetchy dam site)†	Sequoia
Tuolumne River (below Hetch Hetchy dam site)	Sequoia
Tuolumne River (at Hetch Hetchy cabin)	Sequoia
Tuolumne River	Groveland
Tuolumne River (South Fork)	Groveland
Tuolumne River (South Fork)	Sequoia
Turlock canal	Lagrange
Utica Gold Mining Co.'s canal	Avery
Ventura River†	Nordhoff
West Pasqual ditch†	Escondido
West Walker River	Coleville
Whiskey Creek	North Fork
Yosemite Creek	Yosemite
Yosemite Power Co.'s canal	Lagrange
Yuba River	Smartville
Yuba River (Middle Fork)	North San Juan
Yuba River (North Fork)	Goodyear Bar
Yuba River (North Fork of North Fork)	Downieville

Much progress has been made in increasing the accuracy of the stream-flow data by the use of improved field and office methods. This has been accomplished without materially decreasing the extent of the investigations. Several gaging stations have been relocated at sites where natural conditions are more favorable and improved equipment has been installed, where practicable.

The Hetch Hetchy work, which was undertaken at the request of M. M. O'Shaughnessy, city engineer, for the city of San Francisco, about two and one-half years ago, has been continued. All gaging stations are equipped with water-stage recorders and the construction has been permanent in character. This work is now on a very satisfactory basis. On account of the additional cooperation recently furnished by the Bureau of National Parks, the important work in Yosemite Valley has been extended. Two new gaging stations equipped with water-stage recorders have just been completed. The cooperative agreement between the U. S. Forest Service and the county of Los Angeles has resulted in the undertaking of an intensive study of the run-off of streams having their sources in the Angeles National Forest in Los Angeles County. Increased assistance and much valuable stream-flow data are furnished by municipalities, irrigation districts, corporations, and private parties throughout the state.

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†Station discontinued.

The floods of January, 1916, in southern California, greatly exceeded the maximum records previously recorded by the Geological Survey. Nearly all the gaging stations in this portion of the state were destroyed, the damage to equipment being approximately $2,600. In a few instances it has been necessary to abandon previous sites and install entirely new stations on account of the great changes in the channels caused by the floods. It is expected that all this work will be reestablished on a satisfactory basis before the rainy season arrives.

The following Surface Water-Supply papers have been published since your last report: Papers 330 and 331, which contain the stream-flow data for stations in California for the year ending September 30, 1912; Paper 340, parts X and XI, which lists all gaging stations maintained in California from 1885 to 1913. There are also lists of publications relating to the water resources of the state, as well as hydrologic reports of general interest. Paper 360 contains stream-flow records for California stations in the Great Basin drainage for the year ending September 30, 1913.

Papers 361 and 391, annual progress reports for California for the years ending September 30, 1913 and 1914, and Paper 390, which contains data for California stations located in the Great Basin drainage for the year ending September 30, 1914, are at the printing office and will be available for distribution in a short time.

The compilation of the stream-flow data for Paper 411 for the year ending September 30, 1915, is nearly completed.

In addition to the regular publications, two special Water-Supply papers are in preparation: "Water Resources of San Diego County," and "Southern California Floods of January, 1916." The former paper will be a complete report covering the geology, ground waters and surface waters to date for that portion of the country west of the divide. The latter paper will include all available data bearing on the recent floods.

In the administration of the work of this branch of the Geological Survey, the district office is maintained at 328, Custom House, San Francisco. A suboffice is retained at 619, Federal Building, Los Angeles, for the convenience of that portion of the state. Data collected by all branches of the Geological Survey may be consulted at either office.

STREAM FLOW.

The result of stream measurements made in the Great Valley is summarized in the following tables. Many intermittent streams pour water into the valley in the rainy seasons, but they are so "flashy" in character that it is impracticable to maintain gaging stations upon them with the funds available for that purpose.

In San Joaquin Valley no perennial streams reach the river from the west side. On the east side are several of the intermittent class of streams, such as Chowchilla and Fresno rivers, Deer Creek, White River, Peso and Caliente creeks, all of which contribute considerable quantities of water in flood times, but are not metered.

In Kern basin the only stream of sufficient size to warrant the maintenance of gaging stations is Kern River.

TABLE No. 16.

Flow of Water Into Sacramento Valley, October 1, 1903, to September 30, 1915.

Stream	Drainage area, square miles	Maximum flood flow second-feet	Maximum mean daily flow, second-feet	Maximum monthly flow, acre-feet	Minimum monthly flow, acre-feet	Maximum annual flow, acre-feet	Minimum annual flow, acre-feet	Mean annual flow, acre-feet	Available storage capacity, acre-feet
Sacramento	10,400	278,000	254,000	4,480,000	265,000	15,900,000	6,370,000	10,858,200	[5]1,316,000
Stony Creek[7]	601	36,000	29,300	391,000	50	894,000	127,000	554,300	144,000
Feather River	3,640	187,000	187,000	2,450,000	59,600	9,340,000	2,090,000	5,883,300	775,600
Yuba	1,220	[6]125,000	111,000	1,410,000	13,800	4,560,000	1,130,000	2,852,700	138,000
Bear[1]	263	25,800	25,800	296,000	806	726,000	87,600	402,500	----
American[1]	1,910	119,000	105,000	1,520,000	7,320	6,480,000	1,260,000	3,641,000	----
Cache Creek	1,230	20,800	20,100	469,000	0	1,280,000	36,900	654,800	176,500
Putah Creek[2]	805	39,400	39,400	474,000	0	895,300	56,300	500,600	318,000
Totals	----	----	----	11,490,000	346,576	----	----	25,347,400	2,868,100
Unmetered streams[3]	3,907	76,000	----	----	----	----	----	----	----
Valley[4]	4,250	25,500	----	----	----	----	----	----	----

[1] Record beginning 1903-1904.

[2] Record beginning 1905-1906.

[3] Estimated from 50 per cent run-off of rainfall recorded in area for storm of March, 1907.

[4] Estimated from 40 per cent run-off of rainfall recorded for storm of March, 1907.

[5] The capacity of the Big Valley reservoir on Pit River is stated to be 3,196,000 acre-feet, but as the mean annual flow of Pit River at that point for a period of five years was 713,000 acre-feet, that amount is taken as the available storage capacity of the stream at that site. The capacity of Warm Springs Valley and Round Valley and others above Big Valley are omitted, as their storage would simply reduce the flow reaching Big Valley reservoir. To the Big Valley storage is added the storage of a proposed reservoir at Iron Canyon, which is estimated at 603,000 acre-feet.

[6] These figures are the estimate made by the California Debris Commission as the quantity flowing just prior to the destruction of the debris barrier below Smartsville. The maximum recorded at the gaging station was 111,000 second feet.

[7] Station discontinued October, 1912.

TABLE No. 17.

Annual Flow of Sacramento River and Tributaries.

(Expressed in acre-feet for each year, 1903-1904 to 1914-1915.)

[1]Stream	1903-04	1904-05	1905-06	1906-07	1907-08	1908-09	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15	Mean
Sacramento	15,900,000	10,600,000	11,100,000	13,700,000	7,720,000	13,400,000	8,910,000	9,910,000	6,370,000	6,865,000	13,503,000	12,290,000	10,858,200
Stony Creek	753,000	508,000	535,000	765,000	338,000	894,000	351,000	535,000	127,000	[2]219,000	[2]847,000	[2]777,000	554,300
Feather	9,330,000	4,490,000	6,710,000	9,340,000	3,490,000	7,380,000	4,500,000	6,980,000	2,090,000	2,674,100	7,735,300	5,880,000	5,883,300
Yuba	4,100,000	2,400,000	3,630,000	4,560,000	1,590,000	3,880,000	2,670,000	3,510,000	1,130,000	1,397,200	2,865,300	2,500,200	2,852,700
Bear	[2]538,000	315,000	561,000	726,000	188,000	525,000	256,000	512,000	87,600	106,000	543,000	472,400	402,500
American	[2]5,046,000	2,460,000	4,762,000	5,710,000	1,450,000	4,540,000	3,540,000	6,480,000	1,260,000	1,433,700	3,919,600	3,061,300	3,641,000
Cache Creek	890,000	629,000	740,000	983,000	309,000	1,280,000	250,000	496,000	36,900	72,300	1,172,700	999,100	654,800
Putah Creek	[2]672,000	[2]475,000	583,000	691,000	199,000	881,000	228,000	483,000	56,300	133,500	895,300	769,700	500,600
Totals	37,229,000	21,877,000	28,621,000	36,475,000	15,284,000	32,780,000	20,705,000	28,906,000	11,157,800	12,900,800	31,481,200	26,749,700	25,347,400

[1] The "flow year" begins with the rainy season, and is registered from October 1st to September 30th following.

[2] The figures for Bear and American Rivers, 1903-1904, and Putah Creek, 1903-1904 and 1904-1905, are interpolated, and are obtained as a proportion of the recorded flow of the nearest neighboring watershed. They are not assumed to be correct, but are inserted to show probable totals for the years when the record was incomplete. The same is true for Stony Creek for years of 1912-1913, 1913-1914, 1914-1915.

NOTE.—Records since September 30, 1912, have not been published. The figures for 1912-1913, 1913-1914, 1914-1915 are provisional—subject to revision for purposes of publication.

TABLE No. 18.

Flow of Water in San Joaquin River Basin, October, 1907, to September 30, 1915.

Stream	Drainage area, square miles	Maximum flood flow, second-feet	Maximum mean daily flow, second-feet	Maximum monthly flow, acre-feet	Minimum monthly flow, acre-feet	Maximum annual flow, acre-feet	Minimum annual flow, acre-feet	Mean annual flow, acre-feet
San Joaquin	1,640	38,800	38,800	946,000	16,200	3,560,000	1,050,000	2,049,260
Merced	1,090	37,200	37,200	465,000	[1]3,040	2,120,000	440,860	[2]1,035,640
Tuolumne	1,500	52,600	52,600	821,000	3,900	3,410,000	1,050,000	2,000,520
Stanislaus	935	36,900	36,900	491,000	238	2,320,000	494,050	1,235,480
Calaveras	395	69,600	69,600	323,000	0	675,000	31,360	255,390
Mokelumne	612	16,700	16,700	331,000	3,960	1,530,000	393,000	847,690
Cosumnes	524	22,400	22,400	264,000	131	874,000	127,300	418,020
Totals		274,200				14,489,000	3,586,570	7,842,000

[1] October, 1913.

[2] Six-year mean.

TABLE No. 19.

Annual Flow of the San Joaquin River and Tributaries Expressed in Acre-feet for Each Year From 1907-1908 to 1914-1915.

Stream	1907-08	1908-09	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15
San Joaquin	1,140,000	2,900,000	2,040,000	3,560,000	1,050,000	868,400	2,868,700	1,967,000
Merced	518,000	1,480,000	1,140,000	2,120,000	515,000	440,860	[1]	----------
Tuolumne	1,070,000	2,650,000	2,080,000	3,410,000	1,050,000	1,075,560	2,023,700	2,044,880
Stanislaus	593,000	1,890,000	1,370,000	2,320,000	587,000	494,050	1,584,360	1,045,460
Calaveras	[2]67,200	472,000	195,500	675,000	63,000	31,360	272,700	266,360
Mokelumne	480,000	1,150,000	906,000	1,530,000	393,000	423,000	1,076,700	822,800
Cosumnes	148,000	638,000	463,000	874,000	139,000	127,300	547,550	407,310

[1] Record discontinued.
[2] Record incomplete.

TABLE No. 20.

Flow of Streams in Tulare Lake Basin.

Seasonal year	Tule River				Kaweah River				Kings River				Total of three streams, acre-feet
	Discharge in second-feet			Total acre-feet	Discharge in second-feet			Total acre-feet	Discharge in second-feet			Total acre-feet	
	Maximum	Minimum	Mean		Maximum	Minimum	Mean		Maximum	Minimum	Mean		
1903-04	2,305	7	97	70,300	2,920	40	516	373,000	15,700	130	2,400	1,740,000	2,183,300
1904-05	822	7	99	71,000	2,730	40	466	388,000	9,795	150	1,970	1,430,000	1,839,000
1905-06	4,350	8	461	335,000	8,160	40	1,497	1,090,000	26,600	150	5,300	3,856,700	5,281,700
1906-07	2,300	28	214	154,000	3,400	75	820	594,000	15,600	330	3,790	2,750,000	3,498,000
1907-08	1,230	6	113	81,400	1,600	42	348	253,000	6,920	265	1,425	1,030,000	1,364,400
1908-09	5,070	21	397	285,000	9,210	51	1,110	800,000	20,300	265	3,890	2,810,000	3,895,000
1909-10	5,430	5	162	117,000	7,910	34	481	350,000	14,700	270	2,450	1,780,000	2,247,000
1910-11	2,780	9	168	121,000	6,610	39	755	546,000	20,500	196	3,900	2,830,000	3,497,000
1911-12	260	1	69	49,800	2,360	30	285	207,000	12,400	168	1,330	968,000	1,224,800
1912-13	248	1	40	29,200	1,470	32	305	111,500	7,210	136	1,300	941,800	1,082,500
1913-14	4,710	2	173	125,200	9,880	30	672	486,000	[1]30,400	186	3,520	2,548,400	3,159,600
1914-15	1,380	8	142	102,800	3,280	45	511	369,500	16,300	190	2,510	1,817,100	2,289,400
Mean 12 years	----------	----------	178	128,480	----------	----------	647	459,830	----------	----------	2,815	2,041,830	2,630,140

[1] Maximum flow at crest of flood, 62,000 second-feet.

KERN RIVER BASIN.

As stated above, this is the only stream in this region of sufficient importance to warrant a record of flow being secured. Gaging records were obtained of this stream by the State Engineering Department from 1879 to 1884. In 1893 the Kern County Land Company, which controls all of the waters of the river, established a gage at the mouth of the canyon, which has been maintained ever since. The records, which are furnished by the land company, show that for a period of 23 years the mean annual discharge of the stream was 804,000 acre-feet.

Other stations are maintained in the mountains by different power development companies who are engaged in or contemplate the development of power.

TABLE No. 21.

Flow of Kern River.

Seasonal year	Discharge in second-feet			Total acre-feet
	Maximum	Minimum	Mean	
1903–04	3,167	150	638	469,000
1904–05	3,039	194	756	548,000
1905–06	9,505	175	2,528	1,840,000
1906–07	4,504	433	1,606	*869,000
1907–08	2,080	272	900	*380,000
1908–09	8,851	249	2,300	1,630,000
1909–10	4,656	248	1,020	740,000
1910–11	4,623	243	1,384	1,000,000
1911–12	2,919	100	579	421,000
1912–13	1,826	136	494	357,800
1913–14	18,287	197	1,510	1,094,500
1914–15	4,249	225	917	664,000
1915–16	17,962	224	3,390	2,463,100
Mean, 13 years			1,394	959,700

*Records incomplete.

GROUND WATERS.

Although of the surface waters of the state, if all could be conserved and applied to the lands, there would be enough to irrigate all of the land requiring water, physical conditions are such that only a small portion of it can be utilized.

Many streams—those along the northwest coast, for instance—are in regions where little or no irrigation is required, and impassable mountains lie between them and the lands requiring water. Nearly all streams are subject to periods of diminished flow alternating with floods. Nearly, or quite all, of the latter must go to waste.

The streams of the state afford approximately 60,000,000 acre-feet of water annually, and while some is intercepted and carried upon the lands, and storage in reservoirs will enable more of it to be used, the lack of sufficient storage opportunities will always allow the great majority of the water to be dissipated.

All surface waters come from precipitation from the clouds in the form of rain or snow, which, falling upon the surface of the land, and descending its slopes, is gathered together into rivulets, brooks and rivers.

All of the precipitation, however, does not run off in visible streams, but part is absorbed by the soil, and always driven downward by the force of gravity, reaches untold depths in the earth. A portion again finds its way to the surface through natural springs, while still another portion may be recovered by means of wells.

Throughout many portions of the state large quantities of water are brought to the surface from wells, some flowing by hydrostatic force, others pumped.

Many large areas of land exist which can never be irrigated from any surface source, but often are underlaid with water-bearing strata, from which a supply may be obtained. Indeed, a number of prosperous communities have grown up from the profitable cultivation of the soil under irrigation from wells.

All of the cities, towns and homes throughout the San Joaquin Valley obtain water for domestic use from underground sources.

To ascertain the extent and accessibility of bodies of underground water then is a contemporaneous duty with that of investigating the surface supply. Responding to that duty the United States Geological Survey, in cooperation with the state and other public agencies, has been for several years prosecuting research into matters affecting the recovery of water from underground and applying it to use on the surface.

The first field of investigation after cooperation was established between the government and the state, was in the foothill belt of southern California, followed by examinations in San Joaquin Valley. In 1909 a report was published of research made in a portion of the Colorado Desert known as Coachella Valley. A report was also made of the underground resources of Antelope Valley, a part of the Mojave Desert. In 1912 surveys of underground water was begun in Santa Clara Valley and in Sacramento Valley, the results of which have been published.

Observations of the effects on the underground supply due to pumping and seasonal replenishment have been conducted for several years in southern California, the results having been published from time to time.

By the cooperation of the city of Los Angeles, exhaustive study was made of the underground storage in the detritus cones at the mouths of the streams entering Owens Valley from the Sierras.

The city and county of San Diego have cooperated in investigations of the water resources, underground and surface, of the county west of the mountain divide. The report will soon be published.

A comprehensive volume on the mineral and hot springs of California was published since the last report. A perusal of this interesting work is convincing that all the healing virtues of the famous spas of Europe are possessed by the waters of our own springs.

About 700 springs of various degrees of importance are described, scores of which were not known to the public until the publication of this report. It may be stated that by no means have all of these springs been developed as health or pleasure resorts, and undoubtedly many of those now unknown will some day become famous for their healing virtues.

A partial list of reports and publications treating of the underground waters of California, issued from the government press as "Water Supply Papers," follows:

W. S. P. No. 59. Development and Application of Water in Southern California, Part I. J. B. Lippincott. 1902.
W. S. P. No. 60. Development and Application of Water in Southern California, Part II. J. B. Lippincott. 1902.
W. S. P. No. 89. Water Resources of Salinas Valley. Homer Hamlin. 1904.
W. S. P. No. 112. Underflow Tests in the Drainage Basin of Los Angeles River. Homer Hamlin. 1905.
W. S. P. No. 137. Underground Waters in Eastern Coastal Plane of Southern California. W. C. Mendenhall. 1905.
W. S. P. No. 138. Underground Waters in Central Coastal Plane of Southern California. W. C. Mendenhall. 1905.
W. S. P. No. 139. Underground Waters in Western Coastal Plane of Southern California. W. C. Mendenhall. 1905.
W. S. P. No. 142. Hydrology of San Bernardino Valley. W. C. Mendenhall. 1905.
W. S. P. No. 219. Ground Waters and Irrigation in Southern California Foothill Belt. W. C. Mendenhall. 1908.
W. S. P. No. 223. Preliminary Report on the Ground Waters of San Joaquin Valley. W. C. Mendenhall. 1908.
W. S. P. No. 225. Ground Waters of Indio Region (Coachella Valley). W. C. Mendenhall. 1909.
W. S. P. No. 278. Water Resources of Antelope Valley. H. R. Johnson. 1911.
W. S. P. No. 298. Water Resources of Part of Owens Valley. C. H. Lee. 1912.
W. S. P. No. 338. Springs of California. G. A. Waring. 1915.
W. S. P. No. 345-H. Ground Water Resources of the Niles Cone and Adjacent Areas. W. O. Clark. 1915.
W. S. P. No. 375-A. Ground Waters for Irrigation in Sacramento Valley. Kirk Bryan. 1915.
W. S. P. No. 398. Ground Waters of San Joaquin Valley. W. C. Mendenhall, R. B. Dole and Herman Stabler. 1916.

The cooperative investigations of underground water resources during the biennium ending June 30, 1916, were conducted under the direction of Mr. N. C. Grover, chief hydraulic engineer, water resources branch, and Mr. O. E. Meinzer, geologist, in charge, ground water division, whose report follows:

REPORT TO THE DEPARTMENT OF ENGINEERING ON THE PROGRESS OF THE GROUND WATER INVESTIGATIONS IN CALIFORNIA BY THE WATER RESOURCES BRANCH OF THE UNITED STATES GEOLOGICAL SURVEY FOR 1914-1915.

By O. E. MEINZER, Geologist in charge, Ground Water Division.

A comprehensive report on the springs of California by G. A. Waring was published as Water Supply Paper 338. It contains 410 pages of text and 17 illustrations, including a topographic and geologic map of California and a map showing the location and mineral character of the principal springs of the state.

The final report on ground water in the San Joaquin Valley, by W. C. Mendenhall, R. B. Dole, and Herman Stabler, was published as Water Supply Paper 398. It contains 310 pages of text, a map showing artesian areas and ground water levels in San Joaquin Valley, and other maps and diagrams.

The field work for the ground water survey of the Sacramento Valley, which was begun in September, 1912, was continued by Kirk Bryan, and was completed about January 1, 1915. A preliminary report by Mr. Bryan on ground water for irrigation in the Sacramento Valley was published as Water Supply Paper 375-A, and the maps and manuscript for the final report on the region were nearly completed. The preliminary report contains 49 pages of text and eight illustrations; it includes a map of the valley showing depths to ground water and a summary table of statistics of ground water irrigation.

Much progress was made by W. O. Clark in the ground water survey of the Santa Clara Valley, which was begun in August, 1912. A report on the ground water resources of the Niles Cone, which is a part of the Santa Clara Valley, was prepared by Mr. Clark and published as Water Supply Paper 345-H. This report contains 42 pages of text and a detailed map showing fluctuations of the water table, etc. It includes an estimate of the quantity of ground water annually available in the area. At the request of the Department of Agriculture, a special report was prepared by Mr. Clark on the ground water supply of the Morgan Hill area, which is also a part of the Santa Clara Valley. This report is to be published as a part of Water Supply Paper 400. Levels were run by L. F. Briggs to determine the altitude of observation wells in parts of the Santa Clara Valley.

Since 1900 measurements of depths to the water level in a series of wells in southern California have been made at intervals for the purpose of obtaining a record through many years of the relations between the contributions to the underground reservoirs in the rainy seasons and the withdrawals from them in the dry seasons, when ground water is pumped for irrigation and is withdrawn in large quantities by evaporation and transpiration. Most of the records for the period prior to 1909 have been published in Water Supply Papers 213 and 251; the records for 1909, 1910 and 1912, together with a brief discussion by W. C. Mendenhall, were published during the biennial period in Water Supply Paper 331. The work is at present being carried on by F. C. Ebert, who has selected companion wells and otherwise improved the methods. Mr. Ebert has also made progress in the tabulation of all available water level data for the region.

A survey of the ground waters in the San Jacinto Valley, begun several years ago by W. C. Mendenhall, was resumed by G. A. Waring, who did considerable additional field work and nearly completed the report on the area for publication as a Water Supply Paper.

An investigation of the ground water resources of the part of San Diego County lying west of the divide was begun by A. J. Ellis and C. H. Lee. Practically all of the field work and most of the office work were completed by June 30, 1916. The results are to be embodied in a comprehensive report on the water resources of the county. The water samples were analyzed by S. C. Dinsmore. Financial cooperation was furnished by the city of San Diego.

IRRIGATION INQUIRY.

In 1905, the state of California and the United States Department of Agriculture entered into a cooperative agreement for the investigation of subjects relating to irrigation and continuously since that time the investigations have been going on.

The United States is represented in this matter by the Office of Public Roads and Rural Engineering, formerly by the Office of Experiment Stations, while the Department of Engineering represents the state.

By cooperation with the college of agriculture of the University of California and the use of a portion of the University Farm at Davis, Yolo County, for experiments, the work is broadened and intensified to the mutual advantage of all concerned.

The subjects receiving particular attention in the investigations pursued are:

The duty of water as applied to different crops under varying conditions, and the factors which influence it.

Methods of irrigation with a view of securing better practice.

Methods and costs of pumping.

Loss from canals through seepage, evaporation and wasteful methods and the best means of reducing them.

The organization of irrigation enterprises, particularly irrigation districts and mutual water companies.

During the biennium just closed, special attention has been given to the study of duty of water in the irrigation of alfalfa. In addition to the experiments conducted on the University Farm, extensive observations and experiments have been conducted throughout the Sacramento Valley.

Alfalfa farms have been selected having widely different characteristics of soil, of drainage, of preparation and other features which affect the application of water and its influence on production. The quantity of water applied and its rate of application were measured. The movement of the water through the soil, the depth and rate of penetration, and time of retention, all were ascertained. And finally the crop was weighed and the yield per acre learned.

All of the experiments demonstrate beyond question that at Davis the irrigation of alfalfa increases the yield according to the quantity of water applied up to a depth of irrigation of 36 inches; that the further application of 12 inches of water is without effect, while a still greater increase of irrigation water causes a decrease in crop yield.

The increase of crops due to each increment of water added from 12 to 30 inches is sufficient to insure additional profit for each irrigation, but the application of an additional six inches of water may cost as much as the profits on the slight increase of yield amounts to, while water applied beyond 36 inches may result in absolute loss.

Thirty to thirty-six inches in depth then is the limit of profitable application of water to the irrigation of alfalfa under the conditions of soil and climate found at Davis.

The experiments conducted extensively elsewhere show that the same law applies throughout the Sacramento Valley.

It may be argued that the results obtained as above stated would not apply in other regions, say in Oregon or Arizona.

It is admitted that under varying conditions the line of demarcation between profit and loss due to the quantity of water applied will not be exactly at 30 or 36 inches, but it is urged that no matter whether it be 20 inches or 48, or any other depth, the diagram illustrates a law that applies to the irrigation of alfalfa, and probably of all other crops, everywhere.

There is a quantity which can be determined within comparatively narrow limits which will give the best results. That limit the irrigator should know, and it is a duty of government to ascertain it for him—a duty the cooperating agencies mentioned are endeavoring to perform.

In studying methods of irrigation, considerable attention has been given since the last report to overhead irrigation by sprinkling.

The study of irrigation districts was concluded and the results were published as Bulletin No. 2 of this department and is reproduced in this volume as an appendix.

It might seem that the question of flood control is foreign to irrigation inquiry, but when flood waters can be directed upon porous, sandy lands into which the water can rapidly sink, losing or lessening its destructive force, and these same waters can afterward be recovered and used for irrigation, the solution of the problem of flood control contributes to the development of irrigation.

The success in Los Angeles and adjacent counties attending the practice of causing flood flows of streams from the mountains to forsake their channels and spread over the debris cones at the mouths of the canyons has been carefully investigated, and the application of the principle to the flashy streams of Coachella Valley has been made the subject of study, a report upon which appears herein under the proper title.

Sanitary engineering is another subject that would at first thought appear to be outside the purview of irrigation inquiry, but since many communities have difficulty in disposing of their wastes, the study of the best methods of applying sewage irrigation is a proper subject for inquiry, and a systematic project has been outlined.

The great waste attending the operation of pumps for irrigation, a waste that is apparent to every engineer who gives even casual attention to the matter is being pursued, and plans are laid for more vigorous investigation of the subject in the near future.

Cooperative investigations into the various phases of irrigation during the past two years have been conducted by Frank Adams, irrigation manager in charge, under the direction of Samuel Fortier, chief of irrigation investigations, Office of Public Roads and Rural Engineering, United States Department of Agriculture.

The report of cooperative irrigation investigations, together with a comprehensive paper dealing with investigations of the economic duty of water for alfalfa in Sacramento Valley, and the report on flood control in Coachella Valley, hereafter presented as Appendixes C and D, respectively.

PROGRESS REPORT OF COOPERATIVE IRRIGATION INVESTIGATIONS IN CALIFORNIA, 1914-1916.

By FRANK ADAMS, Irrigation manager in charge.[1]

Cooperative irrigation investigations have been continued in California during the past two years along the general lines previously followed, the principal cooperating agencies continuing to be the United States Department of Agriculture, the California State Department of Engineering, and the University of California Agricultural Experiment Station.

On July 1, 1915, the irrigation investigations of the Department of Agriculture were transferred from the Office of Experiment Stations, Dr. A. C. True, director, to the Office of Public Roads and Rural Engineering, Logan Waller Page, director.

Investigations Under Way, 1914-1916.

The main field work of the past two years has been the completion of the studies of the duty of water for alfalfa begun in Sacramento Valley in 1910, and Imperial Valley in 1914.

The results of the work in Sacramento Valley are attached hereto entitled "Investigation of the Economical Duty of Water for Alfalfa in Sacramento Valley, California, 1910–1915."

This manuscript covers the cooperative experiments on the duty of water for alfalfa begun on the irrigation tract on the University Farm, at Davis, in 1910 and field studies relating to the same subject conducted on 54 alfalfa farms in Sacramento Valley during 1913, 1914, and 1915, and on a special experimental tract near Willows, during 1915.

Results of the work, both at Davis and on the Sacramento Valley alfalfa farms, have already been partly reported in reviews of the cooperative irrigation investigations during the two preceding bienniums printed in the third and fourth biennial reports of the Department of Engineering.

The results in Imperial Valley during the two-year period, 1914–1916, are now in course of preparation by Mr. C. E. Tait and Mr. Frank J. Veihmeyer; they are in part also being used in the preparation of a general treatise on irrigation of alfalfa in Imperial Valley, by Walter E. Packard, superintendent of the Imperial Valley Substation of the University of California Agricultural Experiment Station, with whom Messrs. Tait and Veihmeyer have been cooperating.

Other work under way during the past two years, with its present status, is outlined below:

1. *Study of irrigation Districts in California, 1887 1915.* Completed, October, 1915, and published as Bulletin No. 2 of the State Department of Engineering.

In addition to the study of irrigation districts in California, the gathering of information about irrigation districts in the other western states has been continued, the expenses of this latter work being paid only in part from the fund set aside for cooperative irrigation investigations in California.

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[1] Under the direction of Samuel Fortier, chief of irrigation investigations, Office of Public Roads and Rural Engineering, United States Department of Agriculture.

2. *Study of Land Settlement Conditions in California.* This was started in the spring of 1914 and in part furnished a basis for the Land Settlement Bill (Senate Bill No. 509) considered in the last legislature. During the present season investigations have been conducted in cooperation with the State Commission on Land Colonization and Rural Credits, the college of agriculture of the University of California, and the Commonwealth Club of California, the participation of the California cooperative irrigation investigations during the season of 1916 being limited to informal cooperation with the agencies named.

3. *Investigations at Davis.* As heretofore, the cooperative irrigation studies and experiments carried on on the irrigation tract at the University Farm, at Davis, other than those relating to the duty of water for alfalfa above referred to, have had to do with the irrigation of and the duty of water for oats, wheat, barley, corn, potatoes, sugar beets, and orchards and vineyards, and with certain phases of the irrigation of alfalfa other than duty of water.

During the season of 1916 two experimental spray irrigation plants have been added to the equipment on the tract and experiments in the irrigation of vegetables by sprinkling have been begun in cooperation with the division of Olericulture of the Department of Agriculture of the University; also experiments in the irrigation of small fruits by sprinkling in cooperation with the division of Pomology.

With the close of 1915 the duty of water studies and experiments with the field crops mentioned as outlined in 1911 were completed and a full report of these experiments and studies, including experiments and studies for several previous seasons, has been prepared by Mr. S. H. Beckett, irrigation engineer, locally in charge at Davis, and is ready for publication. In the work at Davis, Mr. Beckett has been assisted by Mr. O. W. Israelsen and Mr. Roy Wray.

4. *Irrigation of Small Fruits in California.* Information along this line gathered from time to time, some years ago, has been worked over and supplemented by further field studies by Wells A. Hutchins, and his report thereon has been published by the college of agriculture of the University of California as Circular 154.

5. *Irrigation of Rice in Sacramento Valley.* Cooperation with the Bureau of Plant Industry of the United States Department of Agriculture was begun in 1914 at the Rice Experiment Station at Biggs, a preliminary report thereon having been submitted with the report of cooperative irrigation investigations, 1912–1914.

This cooperation has now continued during a three-year period, the subjects under investigation having been the duty of water for rice on a 40-acre field adjoining the experiment station, the depth of submerging the rice fields during the principal season of irrigation, the time of submergence with reference to planting and the emergence of the plants above ground, the temperature of the water in the rice fields, and the effect of stagnant water on the growth of the rice.

This work has been done under the immediate supervision of Mr. Ralph D. Robertson, irrigation engineer, who now has in preparation a practical farmers bulletin on rice irrigation in Sacramento Valley.

During the season of 1916 further data on rice irrigation and on the duty of water for rice have been gathered on 18 fields on the west and east sides of Sacramento Valley in the general vicinities of Willows. Maxwell, Princeton, Nelson, Richvale, Biggs, Gridley and Marysville.

This latter study has been conducted under a separate cooperative agreement between the Office of Public Roads and Rural Engineering and the California State Water Commission, so that a report thereof will be submitted to that commission.

The work has, however, been supervised by Mr. Robertson, and the information gathered is also being used by him in the preparation of the farmers bulletin referred to.

6. *Irrigation of Orchards.* A scientific study of fundamental questions relating to the irrigation of orchards in California has long been needed, but funds have not been available for making it.

It is now hoped, however, to take up this work at once as one of the main projects of the investigations, and as a preliminary to doing so a reconnaissance was made during the season of 1916 of present practice in orchard and vineyard irrigation in northern and central California, and during this same period additional data have been gathered by Mr. C. E. Tait, irrigation engineer, on the irrigation of walnuts and citrus fruits in southern California.

There has been found to exist a wide variation in methods of orchard irrigation which is only partly due to differences in physical conditions, and what is needed is a thorough understanding of the effect of differences in soil moisture content on the different physiological processes of the trees and on the quantity and quality of the product.

The field is so large in California, conditions vary so widely, and so many different orchard fruits are grown here that many years will be required, together with a considerable fund for field expenses, to bring results commensurate with the importance of the problems involved.

7. *Pumping for Irrigation.* As pointed out in the report of cooperative irrigation investigations for the preceding biennium, pumping for irrigation has increased very rapidly in California in recent years, rendering it important that all possible wastes in the installation and operation of farmers' irrigation pumping plants shall be avoided.

A project has therefore been outlined in immediate charge of Mr. Milo B. Williams, irrigation engineer, looking to the practical field study of the problems involved.

During the present season a reconnaissance of irrigation pumping practice throughout the state has been made by Mr. Williams and Mr. S. H. Beckett, irrigation engineers, and this will serve as a guide to the questions it is of most importance to consider first.

Some of the wastes that should be overcome are the results of poor arrangement, excessive lift above the ground surface, and improper relation between lift, speed, and type of pump.

At present the principal work undertaken along this line will be done on a relatively few plants so selected as to give them the most value as demonstrations.

8. *Mutual Irrigation Companies in California.* The report covering this subject previously mentioned as being in preparation by Mr. C. E. Tait, irrigation engineer, is now practically complete and will be available for publication during 1917.

9. *Preparation of Land for Alfalfa Irrigation.* One of the most important of the early cooperative irrigation studies in California had

to do with the preparation of land for irrigation and methods of applying water, the results being published as Office of Experiment Stations Bulletin No. 145.

The data presented in Bulletin No. 145 were supplemented and revised in later farmers bulletins issued by the Department of Agriculture (Nos. 263, 373, 392, 399, and 404), but due to changes in methods and costs it has been found desirable to make further studies, alfalfa being first taken up.

Much new material regarding the preparation of land for alfalfa irrigation was gathered in the course of the study of the economical duty of water for alfalfa in Sacramento Valley previously referred to, but additional data on this subject have been gathered throughout California by Mr. S. H. Beckett, irrigation engineer, during 1916.

The writing of a new manuscript on the preparation of land for alfalfa irrigation has therefore been undertaken, the work being assigned to Messrs. S. H. Beckett and R. D. Robertson.

10. *Minor Cooperative Irrigation Projects at Davis.* In connection with the irrigation studies and experiments on the irrigation tract on the University Farm, at Davis, several subprojects have been started in cooperation with different divisions of the University Agricultural Experiment Station, those relating to the irrigation of small fruits and vegetables by the sprinkling methods having already been referred to.

Others now under way are: (*a*) Irrigation of vines, in cooperation with the division of Viticulture, the work being done on the small experimental vineyard planted on the irrigation tract in 1911; (*b*) irrigation of orchards and small fruits at Davis, in cooperation with the division of Pomology; and (*c*) small plat experiments on the effect of the flooding and furrow methods of irrigation on soil bacteria, in cooperation with the division of Soil Chemistry and Bacteriology.

Another subproject, partly carried on at Davis, has dealt with certain problems of irrigation physics, chiefly with a new method of determining the volume weight of soils "in place," this work being done in cooperation with the division of Soil Technology.

Special Reports.

Special reports have been made from time to time at the request of committees and local organizations.

The chief of these has been a preliminary report on conservation and control of flood water in Coachella Valley made at the request of local parties by Mr. C. E. Tait, irrigation engineer, under specific instructions of the director through the chief of irrigation investigations.

In this connection, and in order to be able to recommend to the Coachella Valley Storm Water District proper methods of controlling and conserving the storm waters menacing Coachella Valley, Mr. Tait made a careful investigation of the spreading of storm water in Santa Ana River, San Antonio Creek, Lytle Creek, and Santiago Creek, in Los Angeles and San Bernardino counties, and of the experiments with check dams made by officials of Los Angeles County in Haines Canyon.

Mr. Tait's report, fully illustrated, follows as Appendix D.

The other of the more important special reports prepared during the past two years, none of which has been intended for publication, have been as follows:

1. Report on the feasibility of the proposed South Santa Clara Irrigation District near Morgan Hill, Santa Clara County.

In this report, which was made with the assistance of Mr. S. T. Harding, irrigation engineer, the organization of the proposed district, with a view to providing means for a complete field investigation and report on the project, was recommended.

2. Report on the feasibility of a pumping irrigation project at Oakley.

This was merely a preliminary report to assist the people at Oakley in determining whether they should unite for a final survey. It was prepared by Mr. S. T. Harding, irrigation engineer, and showed that such a project as has been contemplated for the Oakley section is entirely feasible from an engineering standpoint.

3. Report on the feasibility of the proposed Cosumnes Irrigation District.

This report was made with the assistance of Professor T. Francis Hunt of the college of agriculture of the University of California, and among other recommendations made, was one for a more detailed soil survey prior to finally determining the best course to pursue.

Through the courtesy of Dean Thomas F. Hunt and Professor Charles F. Shaw of the college of agriculture of the University of California, this survey is to be made beginning about November 15, 1916.

Silt Determinations on Colorado River.

During the heavy floods in Colorado River in January and February, 1916, Mr. F. J. Veihmeyer, assistant irrigation engineer, took a number of samples of water from Colorado River at Yuma and from different points on Imperial and Yuma canals for making determinations of the amounts of silt carried. Additional samples were taken from Imperial Canal and from flooded fields in Imperial Valley during the summer.

All of these samples have been settled in tubes in Los Angeles and the results will later be used in connection with similar data previously collected from Colorado River and canals by Mr. C. E. Tait.

Sewage Irrigation.

Although not directly a part of the cooperative irrigation investigations in California, a project has been begun on sewage irrigation, under the immediate direction of Mr. Milo B. Williams, irrigation engineer. Mr. Williams is assisting a number of California cities and towns, and also the University Farm, at Davis, in working out better plans than are now followed in profitably utilizing sewage in irrigation, the expense of this work being almost wholly paid for from funds other than those allotted for cooperative irrigation investigations in California.

Lectures, Advice, and Assistance.

Members of the cooperative irrigation investigations staff have continued to be called on frequently to give lectures before local bodies and communities on irrigation topics, the number of such lectures given during the past biennium exceeding the number given during any previous like period. Frequently expert advice, both in the office and in the field, has been called for and given to the extent practicable.

Irrigation Legislation.

As in previous years, assistance in drafting needed irrigation legislation has been rendered during sessions of the legislature at the request of the Department of Engineering and of members of the legislature.

In 1915 the principal work of this nature had to do with amendments to the California irrigation district act designed to make public regulation of irrigation districts commensurate with the obligation and responsibility of the state in the organization of irrigation districts, and in the issuance of bonds and the construction of works with the proceeds of such bonds.

Present Status of Irrigation in California.

The past two years have been a period of some improvement in the financial conditions of California irrigation projects, of some increase in the irrigated acreage, chiefly in Imperial Valley and in the rice fields of Sacramento Valley, and of the beginning of a number of new important irrigation projects.

The improvement in the financial condition of California irrigation projects has in part been reflected in the higher price received for irrigation district bonds and in part in the financial reorganization of several of the larger projects, such as some of those in Sacramento Valley that were started within the last ten years, but which found themselves unable to succeed according to the original plans of their promoters.

The area devoted to rice growing in California, relatively small down to 1914, increased to 32,000 acres in 1915, and to an estimated 63,000 acres in 1916, of which, in 1916, about 95 per cent has been in Sacramento Valley, with the remainder chiefly in San Joaquin Valley.

This new crop, and also the rapidly increasing acreage of cotton in Imperial Valley, estimated at 98,000 acres in 1916, including about 55,000 acres south of the state boundary, has brought forward for study and solution many irrigation questions that are new to California; and, in the case of rice, this new development has stimulated new construction or extensions of irrigation projects to a degree that is of great relative importance.

The construction within the past two years of the Great Western Canal, already one of the larger of the state's irrigation channels, would not have been feasible at this time except for the demands of rice irrigation, and needs of this crop on the west side of Sacramento Valley have been a considerable factor in facilitating steps toward the financial reorganization of the Sacramento Valley project.

The pending reorganization of this project so as to divide the area served by Central Canal into two irrigation districts aggregating 35,000 acres, an additional district or company of about 90,000 acres directly under Central Canal, and such other smaller divisions as are later needed to care for the remainder of the area under Central Canal, give promise of turning a very unsuccessful enterprise into one that can begin to succeed.

Of the irrigation districts recently formed in California construction is well advanced in Anderson-Cottonwood, Lindsay-Strathmore, and Carmichael districts, and construction plans are well under way in West Side (Tracy) and Terra Bella districts.

In the Fresno section the big water problem continues to be the working out of some form of organization of the six communities involved in the use of water from Kings River for the financing and construction of the proposed Pine Flat reservoir, and for the coordination of the requirements of both irrigation and drainage.

A solution of the problem has recently been brought nearer by the completion for the United States Reclamation Service of a thorough engineering study of the entire situation, both as it affects the late-season irrigation needs of much of the land now irrigated from Kings River, and the drainage needs of extensive areas of lands injured by the rise of ground water.

By a combined plan of constructing the proposed Pine Flat reservoir and of withdrawing water from water-logged areas, both in normal years and to carry over abnormally dry years, the way now seems open, under proper organization and financing, for caring for the needs of 800,000 acres physically tributary to Kings River and commercially tributary to the towns and cities of Fresno County.

In Los Angeles County the outstanding irrigation event of the past two years has been in connection with the development of San Fernando Valley. A temporary irrigation system was constructed to care for immediate irrigation needs, but the installation of a complete pipe distributing system to supply Los Angeles aqueduct water to 76,000 acres in Los Angeles County Water Works District No. 3, is now under way and well advanced, the total bond issue to cover its cost being $2,606,000.

In addition, plans are completed and some preliminary work has been done by the city of Los Angeles for a similar distributing system for 11,215 acres comprised in Los Angeles Municipal Improvement District No. 2, lying within Los Angeles in San Fernando Valley, a bond issue of $360,000 being pending to cover the cost of the improvement.

In Imperial Valley the chief events of interest have been connected with the final taking over of the Imperial Canal by Imperial Irrigation District, the ultimate form of control to be established, and the extension of the High-line canal on the east side of the valley to add a total of 130,000 acres to the area in the valley under ditch.

While Imperial Irrigation District was at last able to solve the intricate legal and financial questions involved in the transfer of the property from the creditors of the old California Development Company, it has not thus far succeeded in overcoming certain physical difficulties connected with maintaining an adequate water supply at all times.

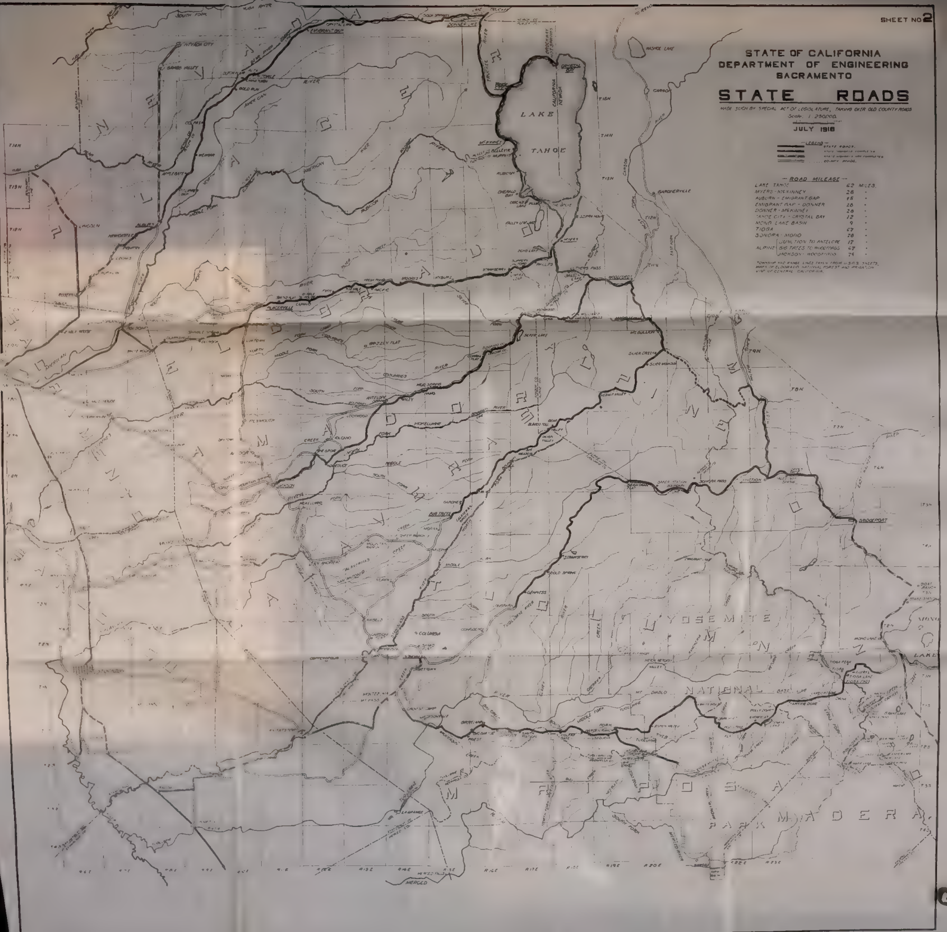
As a result of these physical difficulties, and also because of the human problems involved in working out cooperatively such large questions as Imperial Valley presents, the proposal to seek some kind of a working agreement with the United States Reclamation Service has again come into first place before the people of the valley.

In the mean time consulting engineers have been employed to recommend a two-year program of reconstruction that will include, among other things, a new heading in Colorado River, straightening of portions of the Alamo channel in Mexico, to add grade and reduce silting, strengthening of levees in the region of Volcano Lake, replacing of numerous structures and adding others, and some final decision regarding the extension of Cerro Prieto Canal.

PLATE XX.

A charming view from a scenic state road.

"Sleeping Waters"—Along a scenic state road.



STATE OF CALIFORNIA
DEPARTMENT OF ENGINEERING
SACRAMENTO

STATE ROADS

MADE SUCH BY SPECIAL ACT OF LEGISLATURE, TAKING OVER OLD COUNTY ROADS

Scale: 1:250000

JULY 1918

— LEGEND —

STATE ROADS.
STATE HIGHWAYS COMPLETED
STATE HIGHWAYS NOT COMPLETED
COUNTY ROADS.

— ROAD MILEAGE —

LAKE TAHOE		62	MILES.
MYERS - McKINNEY		28	"
AUBURN - EMIGRANT GAP		45	"
EMIGRANT GAP - DONNER		28	"
DONNER - McKINNEY		26	"
TAHOE CITY - CRYSTAL BAY		12	"
MONO LAKE BASIN		9	"
TIOGA		67	"
SONORA - MONO		78	"
ALPINE	JUNCTION TO ANTELOPE	17	"
	BIG TREES TO WOODFORDS	67	"
	JACKSON - WOODFORDS	74	"

TOWNSHIP AND RANGE LINES TAKEN FROM U.S.G.S. SHEETS, MAPS OF ELDORADO NATIONAL FOREST AND IRRIGATION MAP OF CENTRAL CALIFORNIA.

PART III.

STATE ROADS AND HIGHWAYS.

Two distinct systems of public highways are under state administration in California.

One system dates from 1895 when the legislature declared the road from Placerville, El Dorado County, to the state line near Lake Tahoe to be a state road, and created a commission to take charge of it. The other system was inaugurated in 1910 when the people voted a bond issue of $18,000,000 with which to construct a system of highways throughout the state. The fund so provided, and the construction of the highways thereunder, are administered by a branch of the Department of Engineering delegated for that purpose and designated the California Highway Commission.

For convenience in distinguishing the two systems of highways described above, the roads built or acquired with the proceeds of state bonds are designated state highways, while the roads of the other class are referred to upon the records of the department as state roads.

Leaving the discussion of the state highways for another article, a brief description of the state roads, and the work expended upon them during the last two years, is here presented.

State Roads.

The system of state roads, beginning with the acquisition by the state of the Placerville-Lake Tahoe road, as stated above, has been gradually extended from time to time by the taking over to state control of county roads and the construction of new roads in the mountainous regions where the building and maintenance of roads in condition for free travel would be beyond the financial ability of the counties supporting them. The system now embraces a number of roads, each created by a special act of the legislature, and bearing the name usually designated in the act creating it. These roads are situated in many different counties and aggregate about 700 miles in length. The official names and the counties traversed by them are as follows:

Alpine State Highway—El Dorado, Alpine, Mono, Calaveras and Amador.
Auburn-Emigrant Gap State Highway—Placer.
Big Oak Flat State Highway—Tuolumne and Mariposa.
California Redwood Park State Road—Santa Cruz and San Mateo.
Emigrant Gap State Road—Placer and Nevada.
Kings River Canyon State Road—Fresno.
Lake Tahoe Wagon Road—El Dorado.
Lassen State Highway—Lassen.
Mono Lake Basin State Road—Mono.

McKinneys-Donner Lake State Highway—Placer and Nevada.
Myers Station-McKinneys State Road—El Dorado and Placer.
Pasadena State Highway—Los Angeles.
Sierra State Highway—Sierra.
Sonora-Mono State Road—Tuolumne, Alpine and Mono.
Tahoe City-Crystal Bay State Highway—Placer.
Trinity-Humboldt State Highway—Trinity and Humboldt.

It will be observed that some of the foregoing are called "State Roads," while others are termed "State Highways." There is no reason why all should not be designated by the same term. Most of the names are long and cumbersome, several being compound and far from euphonious, while some are misleading as a designation of locality. Several of these roads traverse localities wherein were enacted much of the romance and tragedy of California's early history, and might appropriately bear names commemorative of those events. The further discussion of this subject will appear in another article.

The foregoing list of state roads is arranged alphabetically, but in the following descriptions they are arranged so the descriptions will appear in a regular sequence, according to the locality of the roads. For convenience, all roads under this division are referred to, in the records of the department, as state roads.

Kings River Canyon Road. Established 1906 by act of the legislature, to connect the roads of Fresno County at General Grant National Park with the famous Kings River Canyon, a rival of Yosemite Valley in scenic beauty and grandeur. The only means of access to this wonderful region is by pack trail. The surveyed length is 32.8 miles, of which 14.5 miles were built up to November 30, 1914, at a cost of $88,632 for construction and maintenance. No appropriation was made for this road by the legislature in 1915, but during the last period there was $5,958 expended for maintenance from the Motor Vehicle Fund. This road is under the care of J. E. Mitchell, superintendent.

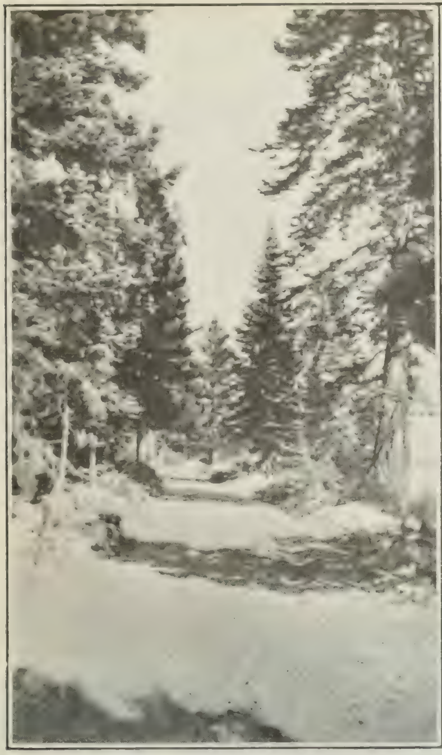
Mono Lake Basin Road. The history of this road has been somewhat stormy and it is believed to warrant being set out at some length.

For many years the people of Inyo, Mono and Alpine counties had advocated the construction of a road across the Sierras, giving a direct route of travel between the communities on the east side of the mountains and the valleys on the west.

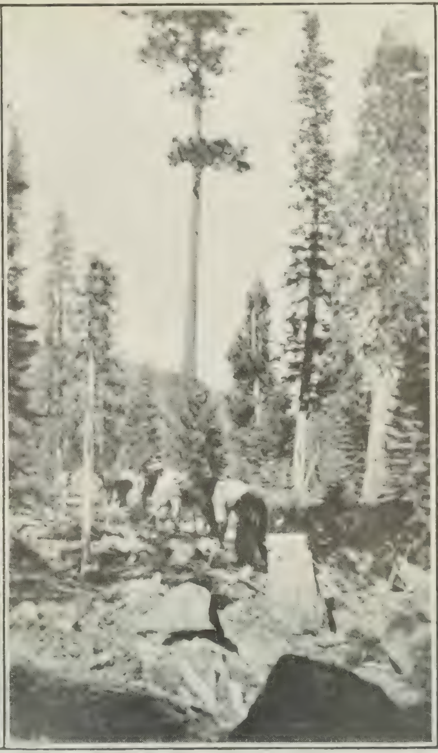
After the creation of the State Bureau of Highways in 1895 and its subsequent change into the State Department of Highways, renewed efforts were made to obtain the road. During 1896–7–8 the Highway Commissioners made examination of several mountain passes that were suggested and recommended the adoption of a route through Leevining Creek. In 1899 a commission was appointed by the Secretary of War to report upon roads for Yosemite National Park and the California

PLATE XXI.

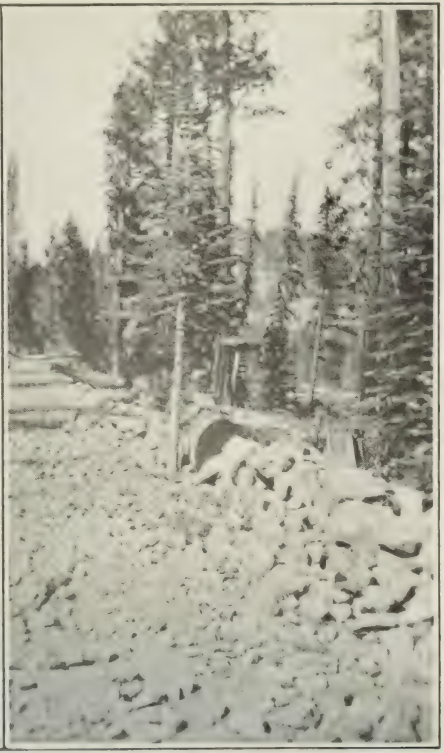
BUILDING STATE ROADS.



Third Stage—Completed.



First stage.



Second stage.

(p. 176)

mmissioner of Highways was made a member of the commission. ne joint commission inspected three routes across the range, viz: eevining Creek Canyon, Bloody Canyon and Mill Creek Canyon, eclaring the first-named to be feasible.

In 1899 the legislature appropriated $25,000 for the construction of "free wagon road connecting Mono County roads with the Tioga ad" and directed the Department of Highways to locate and construct e same.

The Tioga Road was a toll road built by a mining company to give cess to the Tioga mine. It extended from the Big Oak Flat-Yosemite alley road, near Crockers Station, up the Tuolumne River, past uolumne Meadows and over the summit to the mine. The length is proximately 64 miles. The Highway Commissioner was evidently t favorable to the Leevining route as he caused a survey to be made 1900 of the Bloody Canyon route. A change in commissioners having curred, in 1901 the Bloody Canyon route was abandoned and a survey ade up Leevining Creek.

In 1902 a contract was let for the construction of 4.19 miles of the st end of the road. The contractor completed the work in 1903, but e commissioner refused to accept it on the ground that it did not nform to specifications. He retained $3,500 of the money claimed by e contractor, and in 1904 completed the work to his own satisfaction a cost of $4,441.80, which was paid for out of the $3,500 retained d a $1,000 certified check the contractor had deposited in lieu of a nd.

In the mean time the legislature had appropriated another $25,000, d in 1904 a contract was let for the construction of the remaining 11 miles for the sum of $23,861. After completing about two miles his contract the contractor failed and in 1909 the indemnity company hich had furnished a bond for the contractor undertook to complete e contract, but in doing so they ignored the survey and selected a ferent route in places.

The company succeeded at a cost of $18,000 in building the road rough to a connection with the Tioga road. The State Engineer no had succeeded to the duties of State Highway Commissioner fused to accept the road as constructed upon lines and in a manner t prescribed by the specifications. In February, 1912, a settlement as effected and final payment of $5,300.42 made, that being the balance maining from the appropriation.

The cost to the state for construction and for maintenance during nstruction to the time of settlement was $58,210 and the loss to conactors about $17,000 more, making the total cost of 9.3 miles of road nount to $75,000.

The Tioga road was constructed by the Great Sierra Wagon Road Company, a subsidiary of the Great Sierra Consolidated Silver Company, who was engaged in exploiting the Tioga Mine. The road was built as a toll road under a franchise from the county of Tuolumne. Shortly after its completion the mine ceased to operate about 1882 or 1884, and that being the principal reason for building the road, and the only incentive to travel excepting by stockmen and a few hardy tourists who visit the high mountains in summer. The traffic over the road was small. Being charged toll on this road and also over the Big Oak Flat toll road to reach it, tended also to discourage travel.

After travel to the mines ceased, the amount paid for tolls was insufficient to maintain collectors, hence the road received but little attention from its owners. Occasionally fallen timber was removed, and perhaps the worst washouts repaired so that the road was kept measurably passable for teams, and a few availed themselves of the shorter route from Mono Lake Basin to the interior valley.

Fifty-three miles of the road traverse the Yosemite National Park and in 1915 the government acquired it as an asset to the park, and the state legislature appropriated $3,000 for the purchase of that part of the Tioga road, approximately seven miles in length, lying between the park boundary and the Big Oak Flat road. (Chap. 306, 1915.) A requirement of the act was that the county of Tuolumne should terminate the franchise of the toll road company.

At the same time another act was passed (Chap. 396, 1915) declaring the Big Oak Flat toll road, 32 miles long, from Jack Bell sawmill to Cascade Creek, a state highway. To become effective the act required the county of Tuolumne to acquire the road and transfer it to the state and also to set over to the state the county road connecting the Big Oak Flat road with the Tuolumne lateral of the state highway near Chinese Camp. All of these requirements being met, the road extending from the Valley Trunk State Highway between Stockton and Modesto to Mono Lake, is now a state highway excepting the link of 53 miles through the Yosemite National Park, which is maintained by the park authorities.

In addition to the transmountain road operated by the state and government, by the acquisition of the Big Oak Flat toll road, the state has acquired a branch or spur road extending from Sequoia, through the Tuolumne Big Tree grove, 14 miles to Cascade Creek, within about five miles of the wonderful Yosemite Valley. About eight miles of this road is inside the Yosemite National Park. The extension of the road from Cascade Creek to Yosemite Valley is under the jurisdiction of the park superintendent.

PLATE XXII.

Reinforced concrete bridge. Rustic rock culvert.
Tractor breaking old road with a scarifier.

The total distance from the state highway near Chinese to Mono Lake is approximately as follows:

Chinese to Big Oak Flat Road	27 miles
Big Oak Flat Road to Sequoia	19 miles
Sequoia Park line	7 miles
Park line to Tioga Pass (Government Road)	53 miles
Tioga Pass to Mono Lake Basin Road	1 mile
Mono Lake Basin Road	9 miles
Total	116 miles

To connect this road with the Sonora-Mono state road at Bridgeport will require the acquisition and improvement of about 34 miles of county highway now in fair condition.

All of this distance excepting five miles in Leevining Creek Canyon is included in a proposed state highway connecting Bridgeport, Mono County, and Independence, Inyo County, which will be constructed following the approval of the new $15,000,000 bond issue for state highways.

Since the state acquired the Tioga and Big Oak Flat toll roads connecting the state highway system with the Mono Lake basin state road, much work has been done in construction and improvement. This work has been done under the direction of Superintendent E. E. Newell, while W. H. Stone is in charge of the Mono Lake basin division, the costs being met by allotments from the Motor Vehicle Fund.

Sonora Mono State Road. This was formerly a toll road extending across the mountains from Sonora, Tuolumne County, to Bridgeport, Mono County. In the days of mining activity in Bodie it was a very active thoroughfare, but with the decline of travel to the mines, it ceased to be profitable as a toll road, and in 1901 the legislature declared that part of it beginning at Long Barn, 20 miles from Sonora, a state highway. No appropriation was made for the road, and as the owners had sadly neglected it the road was in a very deplorable condition. Nearly all bridges and culverts were decayed and the roadbed itself was in bad condition.

In 1903 the sum of $4,000 was appropriated for maintenance for two years, but with 78 miles of dilapidated road to rebuild, the appropriation could go but a little way. It was estimated that repairs to the road would require the construction of 258 culverts, 26 small bridges, four larger bridges of 35 to 75 feet span, with grading and other work, entailing an expense of $26,000.

In 1905 the legislature appropriated $28,000 for improvement, maintenance and repairs. A power company was engaged in constructing reservoirs in the Tuolumne River canyons, and to expedite its work, rebuilt 38 miles of the road from Long Barn without cost to the state. With the funds appropriated and a further appropriation in 1907 of

$12,000, the remaining 40 miles was greatly improved, including the construction of a steel truss bridge of 70 feet span over West Walker River, and a concrete bridge over the East Fork, besides two other reinforced concrete bridges of 18 and 20 feet span, respectively.

Superintendent L. C. Chase has been in charge of the improvement and maintenance of the west division of this road from Long Barn to Summit and Superintendent C. M. Stewart has had charge of the work on the east division from Summit to Bridgeport. The moneys for maintenance of this road are obtained from the Motor Vehicle Fund.

Alpine State Road. In 1911 the legislature passed an act by which a number of roads traversing Calaveras, Amador, Alpine, Mono and El Dorado counties were declared a state highway. These were roads constructed by the counties or by toll road companies and afterwards acquired by the counties, and aggregate 217 miles.

For convenience the Alpine road is divided into four divisions, as follows:

Alpine road, from Osgoods, on the Tahoe state road, through Markleeville to Mount Bullion.

Calaveras branch, from Calaveras Big Trees Grove, through Ebbetts Pass to Mount Bullion.

Amador branch, from Jackson, Amador County, by way of Carson Pass, to connect with the Alpine road at Picketts, in the lower end of Hope Valley.

Mono branch, from Little Antelope Valley to a connection with the Sonora-Mono road, at junction on East Fork of West Walker River.

A section 24 miles in length between Mount Bullion and Little Antelope Valley has never been constructed. A survey was made in 1912, which indicated that instead of running from Bullion by way of Loop to Silver King Valley, a better route is up the Carson River to Silver King Valley.

If this road from Calaveras branch to the Alpine road in Antelope Valley were constructed it would enable travel to go to Bridgeport via either Tioga or Sonora-Mono road and return by Calaveras or Amador, or continue on to Lake Tahoe, where the choice is offered of returning to Sacramento Valley by the way of Placerville or Truckee and Auburn, and all without leaving the state. Until that link shall be completed, one must go into Nevada in order to pass between Mono and Alpine counties.

No appropriation was made for maintenance and improvement of the Alpine state roads by the legislature of 1915. During the two years last passed, such work has been executed with moneys allotted from the Motor Vehicle Fund, as follows: repair and reconstruction of road bed; improvement of grade and alignment, and construction of bridges and culverts.

PLATE XXIII.

The kind of culvert before the state takes over a road.

The kind of culvert the state builds.

(p. 180)

The four divisions of this road are under the supervision of the following-named superintendents:

Alpine trunk from Osgoods on Placerville-Tahoe road to Picketts, Woodfords, Markleeville and Bullion; Ebbetts Pass branch from Bullion to Pacific Valley; Carson Pass branch from Picketts to Silver Lake is under Grant P. Merrill. The Carson Pass branch from Jackson to Silver Lake is in the care of L. H. Cook; F. W. Mathews has charge of the Ebbetts Pass branch from the Big Trees to Pacific Valley; while the Mono division, from Antelope Valley to Junction on the Sonora-Mono road is under the care of C. M. Stewart. These men have been in charge of their respective divisions for several years, and the growing popularity of these roads with the summer tourist testifies to the quality of the work accomplished by them with limited funds and under unfavorable natural conditions.

Frosts and snow slides in winter and cloudbursts in summer play sad havoc with the roadways, requiring constant and sometimes strenuous effort to repair the damage.

The work of maintaining a mountain road in the condition required for comfortable automobile travel requires the faithful application of knowledge which can be gained only by experience, such as the road force of the department possesses.

Lake Tahoe-Placerville Road. This road was the first mountain road acquired by the state. It was originally a toll road incorporated as the Lake Tahoe Wagon Road. It began near Smiths Flat, three miles east of Placerville and extended over the mountain, for the most part following the overland stage route to the state line near Lake Tahoe. It was declared to be a state road by act of the legislature, approved March 23, 1895. (Chap. 128–1895.) For several years this road was cared for by the Lake Tahoe Wagon Road Commissioner at a salary of $300 a year. Biennial appropriations were made for its maintenance, but they were not large enough to permit much improvement to be effected.

In 1899 the sum of $25,000 was appropriated to repair and rebuild the road, build bridges and make a survey of it. A stone bridge 81 feet long, across the American River, was completed in 1901. The commissioner at this time was receiving $50 a month.

In 1905 the legislature appropriated $15,200 for salary, maintenance and bridges.

In 1907 the Department of Engineering took over the management of the road, completed a stone bridge partly constructed over Trout Creek, and finished making a survey of the road.

The survey is marked by concrete monuments set below the road surface at intervals of 1,000 feet along the center line of the road. Granite mile stones, marked to designate the distance, are set conspicuously by the roadside. These stones are 6x18 inches by 54 inches long, and were cut and marked in the state prison at Represa.

Constant improvement of the road has been progressing ever since the department took charge. Several miles at the lower end are sprinkled daily during the summer.

In 1915 the legislature passed an act extending the state road from Smiths Flat to Placerville, where it connects with the El Dorado Lateral of the state highway system. The total length from Placerville to the state line is 65 miles.

Myers-McKinney State Road. Myers Station on the Placerville-Tahoe state road is in Lake Valley, some eight or nine miles south of Tallac, a summer resort on the lake shore. Prior to 1913, tourists desiring to pass from one end of the lake to the other by teams or automobile, were compelled either to ferry 30 miles on barges, which was uncomfortable and dangerous, or drive to Carson and Reno, Nevada, to Truckee, and then back to Tahoe, a distance of about 100 miles.

In 1911 the legislature appropriated $25,000 to make surveys and construct a road from Myers Station to the lake shore and around the west side of the lake to McKinneys, a resort on the west shore and the end of a road leading to Truckee. The road, 27½ miles long, was opened to traffic in 1913, though not completed until later.

Improvement has been expended upon the road every summer until it is now a very popular scenic way, skirting the shores of the lake above the bluffs. Much remains yet to be done in widening turns, but this is being done as rapidly as funds are provided.

The Lake Tahoe and the Myers-McKinney state roads are in charge of Superintendent H. L. Leventon.

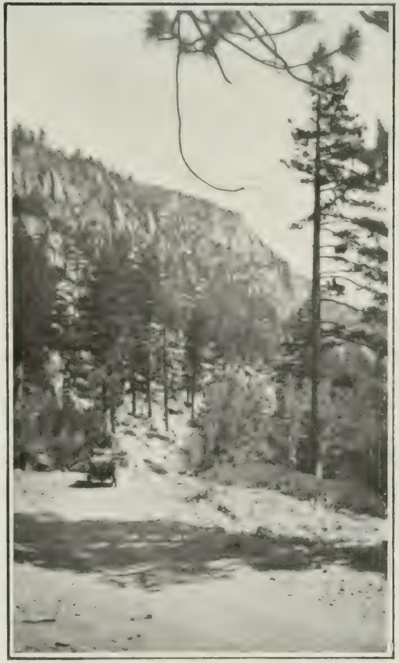
McKinneys to Donner Lake. In 1915 the legislature declared the road running from McKinneys to Tahoe city, and thence to Truckee and the west end of Donner Lake, a state road. No appropriation was made. As soon as the transfer could be completed the Department of Engineering took charge of maintenance and improvement.

The road connects with the Myers-McKinneys state road at the south end and with the Emigrant Gap state road at Donner Lake.

Tahoe-Crystal Bay Road. The legislature, in 1915, made provision, by appropriating $3,000, for the survey and construction of a state road along the north shore of Lake Tahoe from Tahoe city to the state line at Crystal Bay. The road has been surveyed and with the appropriation provided, supplemented by $3,000, furnished for the purpose by Placer County, a considerable portion has been constructed. When completed, this road will enable one to travel entirely around Lake Tahoe in California over state roads.

Emigrant Gap Road. This road begins at Emigrant Gap, on the ridge between Bear and American rivers, and extends thence along the route traveled by the ill-fated Donner party and other immigrants coming into California in pioneer days, through Donner Pass to the

PLATE XXIV.



A rugged scene on state road.

Eagle Falls, from state road.

(p. 182)

west end of Donner Lake. Here it connects with the state road to Lake Tahoe established by legislative action in 1915. The same session of the legislature also declared the road from Emigrant Gap to Auburn a state road, so that now the Emigrant Gap road really extends from Auburn to Truckee over the route traversed by the old emigrant trail.

The original Emigrant Gap state road was taken over by the state in 1909. (Chap. 224–1909.) Most of the roadbed was built by the Central Pacific Railroad to facilitate construction in that stupendous undertaking. After the railroad abandoned it, the county maintained it as a county highway. The roadway was narrow with many steep and rocky stretches. The bridges were all wooden and badly dilapidated when the state took it in charge. These have been mostly eliminated by the construction of concrete bridges and concrete or iron culverts, throughout the old Emigrant Gap road, and the same treatment is being applied to the extensions—east to Truckee and west to Auburn.

Mr. E. M. Baxter, who has been in charge of the Emigrant Gap road for several years, is superintendent and directs the work over the entire route from Auburn to Truckee, from Truckee to Tahoe City and Crystal Bay, and from Tahoe City to McKinneys.

The most notable improvements effected on the Emigrant Gap road this biennium was replacing two dilapidated wooden bridges over the South Fork of Yuba River and one over Castle Creek with substantial reinforced concrete bridges, and the substitution of several concrete culverts for wooden structures.

Several other culverts and small bridges will be built during the months when little travel will interfere with the work, so that the traveler of next season will have little to complain of in the matter of "rickety" culverts.

Sierra State Highway. This road was authorized by act of the legislature in 1907, at which time $12,000 was appropriated to make surveys and construct the road. It is defined as running from Downieville to Mount Pleasant, a distance of 20 miles. About 14½ miles have been surveyed, and in 1908 there were constructed 2.9 miles beginning at Dowieville, at a cost of $8,018.97. The remainder of the fund was exhausted in surveys and in maintenance, the last of the money being used in 1912. There have been no appropriations or expenditures upon the road since the last named date.

This road would be about 20 miles long if completed. Less than three miles have been constructed at a cost of nearly $12,000. In its uncompleted condition it does not afford convenience to any considerable number of people and if completed would not connect any important centers of population or industrial activity; nor will it afford Downieville a good means of reaching the Sacramento Valley.

It is not considered by this writer to be a desirable road to maintain and it is believed that it should not be maintained unless completed. The suggestion is here made that the road be abandoned as a state road.

Lassen State Road. By act approved April 22, 1911, the legislature declared the county road beginning on the boundary line between Lassen and Shasta counties in the northeast corner of T. 37 N., R. 6 E., and running thence to the Lassen-Modoc County line in T. 38 N., R. 8 E., a state road. The road as described originates in Fall River Valley, runs northeasterly via Pittville and Bieber and up Big Valley to the county line a few miles below Adin. The length is 29 miles.

The act establishing it appropriated $5,000 for improvement and maintenance. No records are available of how the money was expended, but no doubt some benefit was received from the expenditure of the appropriation.

Since the present administration assumed charge, no appropriation has been made but considerable work has been expended in improvement and maintenance, the costs being met from the Motor Vehicle Fund. This work is under the supervision of Superintendent H. E. Wood.

Trinity and Humboldt Road. This road was provided for first by an appropriation in 1903 of $1800 for a survey of a road from North Fork, Trinity County, to some point at or near China Flat, in Humboldt County. A survey of 22 miles of the route was made, exhausting the appropriation so that the remaining 22 miles was left unsurveyed. In 1907 an appropriation of $50,000 was made for a road connecting the roads of Humboldt County with those of Trinity, Shasta and Tehama counties. Several routes were considered, each of which had strong advocates, but financial considerations finally led to the selection of the "Mad River Low Gap" route.

Construction was commenced in 1909 and on October 3, 1912, the first automobile passed over the road. Although open to traffic, the road was not completed for another year and even then was not supplied with bridges over South Fork of Trinity River and Mad River, which were built by contract in 1915. Both bridges are of the steel deck-truss type on concrete piers.

This road is 33 miles long, connecting the road systems of Humboldt and Trinity counties, and gives the shortest communication between Humboldt County and the Sacramento Valley, as well as giving the southern part of Trinity County access to the county seat, which, before this road was completed across South Fork Mountain, was possible only on horseback.

No appropriation was made for improvement and maintenance of this road at the last legislative session, but funds were allotted from

PLATE XXV.

A tourist's camp on state road.

Construction camp on a state road.

the Motor Vehicle Fund with which Mr. W. J. C. Dinsmore, superintendent, has continued that line of work.

California Redwood Park State Road. In 1913 the legislature provided for the location and construction of a state highway from Saratoga Gap, on the boundary between Santa Clara and San Mateo counties, through the mountains to the California Redwood Park in Santa Cruz County. Seventy thousand dollars was appropriated and the road was completed in time for the summer travel to the park in 1915.

Most of the roadway is of a nature that it works up into deep dust under wheel traffic and a large part of the cost of maintenance is due to the sprinkling required.

No appropriation has been made for maintenance, but allotments from the Motor Vehicle Fund enable the department to keep the road in good condition.

Mr. W. H. Dool, warden of the California Redwood Park, has had charge of this road since its completion.

Projected State Roads.

In addition to the state roads already established as enumerated above, the legislature has declared for certain other roads to be constructed as state roads, ordered the survey and location of them, but provided no funds for their construction. It is assumed that the intent of the several acts was to later make appropriations for construction, based upon the estimates to be furnished from the surveys.

These projected roads are described as follows:

Yolo and Lake Highway. Chapter 283, statutes of 1915, recites as follows:

> Section 1. A highway commencing at the town of Rumsey in the county of Yolo, state of California, and following generally the meanderings of Cache Creek, along the most practical and feasible route to the town of Lower Lake in the county of Lake, state of California, and to be known as "Yolo and Lake Highway," be and the same is hereby declared and established.

It will be observed that the foregoing declares and establishes a "highway" but not a state highway.

Three thousand dollars was appropriated to make surveys and investigations necessary for the location of the said highway, but no appropriation was made for construction.

A survey has been made following the general route specified in the statute, starting at Rumsey. The total length of the surveyed line is 35 miles. The construction will involve 126 acres of clearing, about 872,000 cubic yards of excavation, 170 culverts from one to eight feet wide and eight bridges aggregating 190 feet in length, the longest being 60 feet.

The total cost of constructing the road as surveyed is estimated at $175,000.

Kern-Ventura State Highway. An act of the legislature, approved June 12, 1915, appropriated $8,000 for the survey and location of a state highway from a point in Kern County south of Bakersfield to the town of Nordhoff, Ventura County.

At the date of this writing the survey is in progress and will be completed in time to submit estimates of the cost of construction for the consideration of the legislature this winter.

Pasadena State Highway. Chapter 704, Statutes of 1915, appropriated $7,500 for the location and survey of a state highway to connect La Cañada Valley with Antelope Valley in Los Angeles County, to be known as the Pasadena State Highway. The route laid down by the statutes for a survey begins about two miles northeast from La Cañada and running thence northerly and northwesterly along Arroyo Seco to a point east of Hoyt's Ranch, thence northeasterly by way of Tujunga Canyon and Mill Creek to Tie Canyon, thence by way of Kennedy Springs to Vincent.

The survey for this road is in progress at the date of this writing and will soon be completed so as to have estimates of cost of constructing the road for the information of the coming legislature.

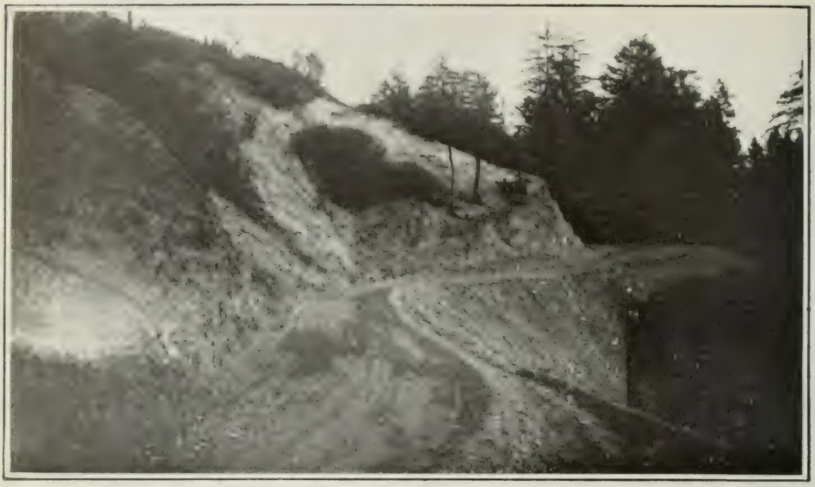
State Aid Roads.

In addition to the state roads and highways established by special acts of the legislature as above described, there have been occasions when the legislature appropriated funds for survey, construction or improvement of certain roads without designating them as state roads. In fact, in at least one instance the act specified that the county should assume responsibility for the maintenance of the road after it had been completed.

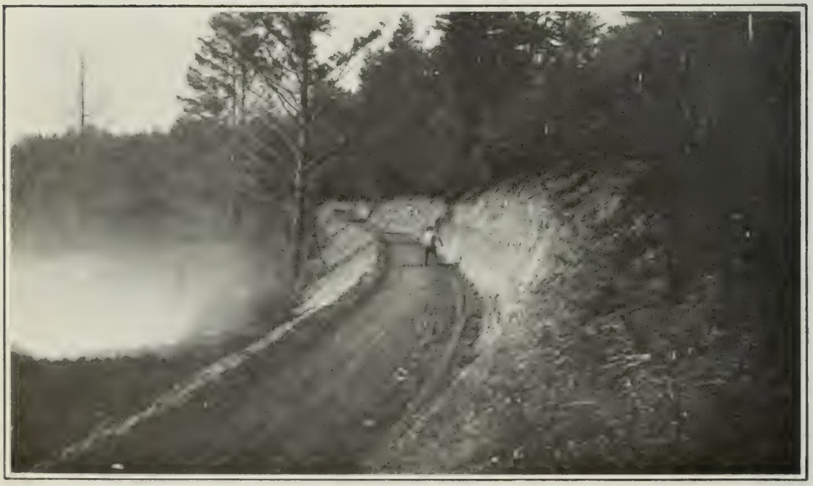
Alturas and Cedarville Road. Chapter 192, approved March 11, 1907, appropriated $7,000 "for aid to the county of Modoc in the construction of permanent work on the county road between Alturas and Cedarville," placing the construction under the direction of the State Highway Commission. The appropriation was made contingent upon Modoc County having first spent $3,500 upon permanent work. The funds were expended during 1907 and 1908, since which time the county has had entire charge of its maintenance.

Middle Lake Highway. Chapter 765, Statutes 1915, appropriated $20,000 for the location and construction of a highway across Middle Lake in Surprise Valley, Modoc County. The road is about two miles in length, crosses the lake and connects at the east end with a county road "leading into Nevada." The soil is not suitable for a roadbed, and can withstand neither wheel traffic nor wave wash. To protect it

PLATE XXVI.



Sidehill grade on Pescadero-Redwood Park Road.



Sidehill grade on Pescadero-Redwood Park Road.

Typical county highway bridges on improved roads.

the roadway was raised above the flood height and riprapped on the slopes with loose rock, the same material being used to metal the surface.

All the rock had to be hauled from the hills some six miles distant by teams. The appropriation was exhausted before the work was completed and a portion remains in an unprotected condition.

This road was not declared by the statute to be a state road, and must be maintained by the county.

Pescadero-Redwood Park Road. The legislature, in 1915, passed an act reciting: "That a highway shall be constructed from Pescadero in the county of San Mateo to the California Redwood Park in the county of Santa Cruz. The responsibility of the state of California in the location, survey, construction and maintenance of said highway shall cease with the expenditure of the appropriation herein contained."

Ten thousand dollars was appropriated for the survey, location and construction of the road, and made contingent upon the Board of Supervisors of San Mateo County pledging the county to complete and maintain the road. This pledge having been made and also a similar pledge by the supervisors of Santa Cruz County, a survey was made and the road partly constructed during the summer of 1916.

The road as located begins at the county highway at the mouth of Butano Creek about four miles from Pescadero, and follows, generally, up the ridge between Butano and Little Butano creeks, to a connection with a county road in Santa Cruz County, near the summit between Butano and Waddell creeks, which, in turn, connects with the Saratoga-Park state road near Bulls Spring.

A survey was made of a route from the summit down Waddell Creek to the center of the park, which it is recommended should be constructed as being shorter and better than the Santa Cruz County road.

Under the terms of the act the completion of the road and its maintenance thereafter devolves upon the county of San Mateo.

The road, when completed, will afford a very delightful "loop" drive, enabling one to motor from San Francisco and the cities on the peninsula, down the Ocean Boulevard, thence by the new road through redwood forests to Redwood Park, returning by the state road to Saratoga and back by way of the state highway.

The estimated cost of completing the road under discussion as located is $35,000 to the summit and down Waddell Creek to the hotel at Governor's Camp.

In concluding the subject of state-aid roads, the Department of Engineering questions the wisdom of appropriating public funds for construction or improvement of roads over which the state will exercise no control in the matter of maintenance.

In the last case above discussed, not enough money was provided for building a road connecting any two accessible points. Several miles yet remain to be constructed before that built from the appropriation can be of any use. It is true that San Mateo County is pledged to complete the road, but to do so with the high standard of construction adopted by the state will entail a heavy burden upon the county, and in such cases the natural tendency is to comply with the terms of the agreement by using a cheaper type of construction not in keeping with the state's work.

While upon the subject of state roads, it is desired to call attention to a matter which must soon be given serious consideration by the legislature. While good roads are built and poor roads improved for the benefit of all the people and everyone has an inherent right to their use, such use must be exercised with due regard to the rights of all others. Among those rights is the one to have the best of condition of roadway maintained at a minimum of cost.

Recent developments of motor transportation tend toward increasingly heavy loads and increased speed of travel, both of which entail immense burdens upon the maintenance of the roads.

A rapidly moving five- or ten-ton truck traveling 12 to 20 miles an hour, on the wheels that are usually provided for such vehicles, will do more injury to the surfacing of a road in a week than will occur from other traffic in several months.

If the cost of maintenance of improved roads is to be kept down to a reasonable figure there must be a limit placed upon the character of traffic allowed upon them. A just relation must be prescribed between the load, the width of tire, the speed, and perhaps also the size of wheel.

The same principle applies to the heavy freighting wagons used in the mountain roads. It costs more to repair the damage done to a few miles of mountain road traveled by heavy narrow-tired wagons during the summer than all the remainder of the roads not subjected to that traffic.

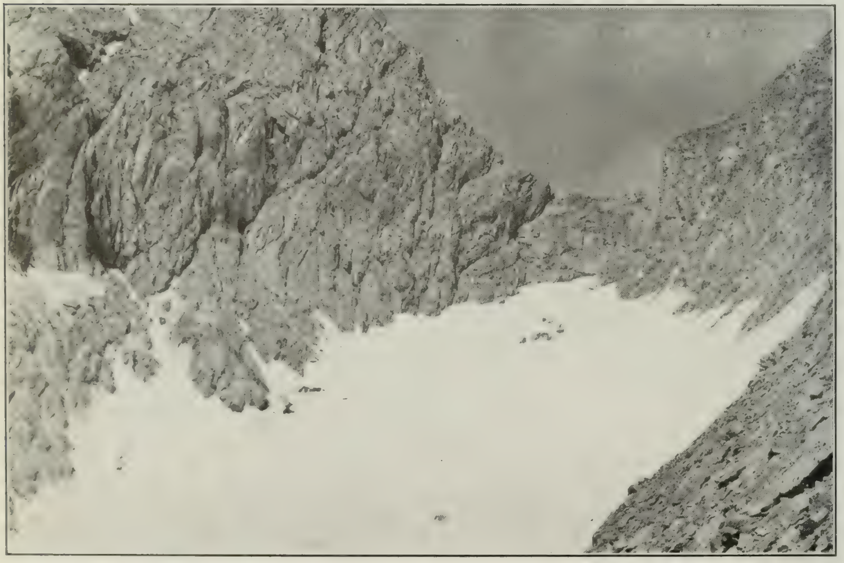
This is a question that is becoming acute and earnest consideration of it is commended to the legislature.

John Muir Trail. Chapter 259, Statutes 1915, appropriated $10,000 to be used toward constructing a trail in the high Sierra region, connecting Yosemite National Park with Mount Whitney and vicinity. "The trail shall be known as the 'John Muir Trail' in honor of the late John Muir, who has performed an inestimable service in making known to the world the wonders of the mountains in California."

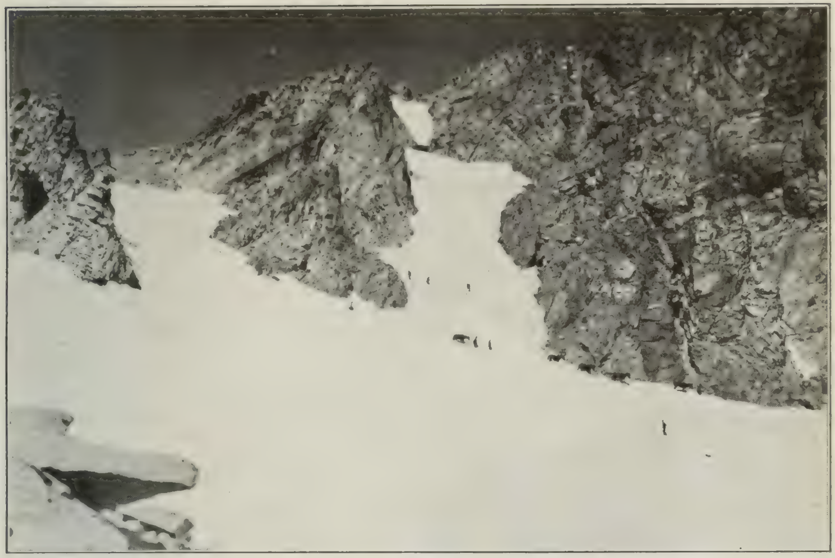
The men of that legislature honored themselves in honoring John Muir by providing him such a monument as he would have chosen—a means of safe access to the scenes he loved so well.

The trail as located by the Department of Engineering, working in cooperative harmony with the officials of the United States Forest Service and the Sierra Club of California, begins at Mirror Lake in the

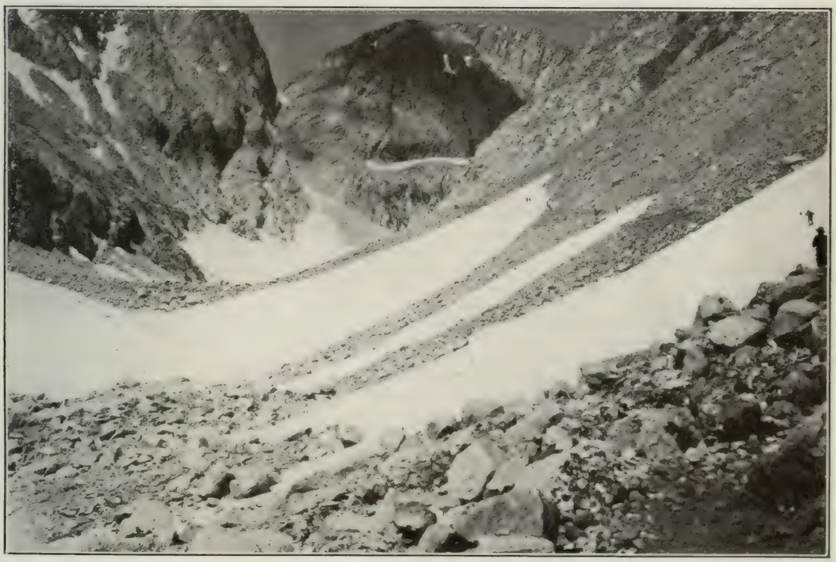
The John Muir Trail—Mount Tyndall, right; Mount Whitney, right center distance; Mount Williamson, left.



John Muir Trail—Cirque at foot of Junction Peak.
(Photo, W. L. Huber.)



The John Muir Trail—Descent from Mount Tyndall in Shepard Pass.



The John Muir Trail—Junction Pass, from Shepard Creek.
(Photo, W. L. Huber.)

Yosemite Valley at an elevation of 4,100 feet above sea level. It then ascends the Tenaya Canyon, crossing over to the Tioga state road, follows it to Tuolumne Meadows, thence up Lyell Canyon to the main summit of the Sierras at Donahue Pass, at an elevation of 11,100 feet, thence following as near to the "Backbone" of the range as practicable, crosses or passes around the headwaters of the great streams which pour their waters into the San Joaquin Valley—the Merced, San Joaquin, Kings, Kaweah and Kern rivers, terminates at the culminating point of the Sierras, the highest point in the United States proper, the summit of Mount Whitney, at an elevation of 14,501 feet above the sea.

By cooperation with the above named agencies, much has been done in the way of constructing the John Muir Trail.

The State Engineer has personally examined the route of the proposed trail and directed its location.

The work of construction has been largely under the direction of officials of the Forest Service and acknowledgment is made of their valuable services, particular mention being made of Mr. M. A. Benedict and Mr. S. W. Wynne, forest supervisors, respectively, of Sierra and Sequoia National forests, as also of Rangers Hughes, Jordan, Slinkard and Clingan, for their intelligent direction of the work assigned to them.

The season in which effective work can be prosecuted is short, not over ten weeks, and usually the snow is not off until July. Only trained mountaineers can accomplish the work required.

It is purposed, as the trail is located and constructed, to erect permanent signs marking it so travelers may follow it without difficulty.

The Sierra Club bulletin says: "The John Muir Trail is a much greater conception than even those who first thought of its possibilities had hoped. It furnishes the great artery for high mountain travel in the Sierra and affords a wonderful opportunity for seeing this magnificent region."

While the appropriation made, augmented by funds donated by Fresno County and the Sierra Club, has enabled enough work to be done to open a passable trail from Mount Whitney to Yosemite Valley —and some of it is very excellent—a great deal remains yet to be done to improve it to a desirable condition.

It is also believed that its usefulness will be greatly enlarged if it be extended northward to Lake Tahoe.

Appropriations should be made of sufficient funds to be expended in improvement and extension as above indicated.

Naming State Roads.

In an earlier paragraph herein there was given a list of the state roads with their official names. Comment was made upon the incongruity of calling some state roads and others state highways, and the suggestion was made that inasmuch as many of these roads traverse regions which were the scenes of many historical events connected with "The days of old—the days of gold, the days of '49," they might properly bear names commemorative of those events.

In this connection it is deemed pertinent to explain that the Emigrant Gap road follows, generally, the route of the old immigrant trail, passing Donner Lake and crossing the range near where the railroad now crosses, and down to Sacramento, or Sutter's Fort, which was the objective of nearly all western-bound adventurers of those days.

Donner Lake, a most beautiful sheet of water ensconced between beetling granite crags, was made famous by the sad story of the Donner Party. This party of immigrants, caught in the winter snows on the east side of the range, were compelled to spend the winter of 1845–46 encamped on the shores of the lake, and being without provisions, 36 men, women, and children perished before rescue parties from Sutter's Fort could reach them.

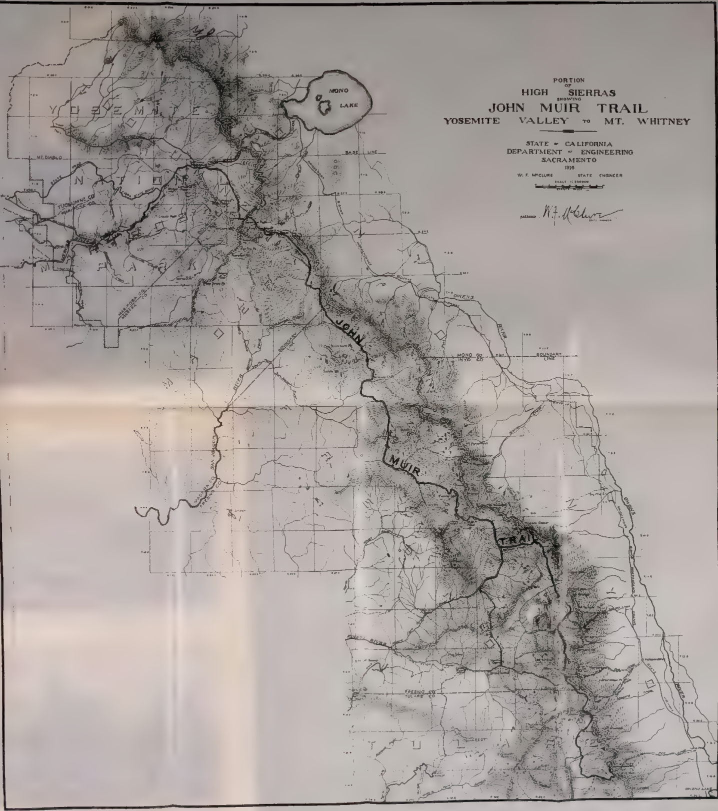
What better way to commemorate that historical event than by calling the road the "Donner State Road"?

The title, "Lake Tahoe Wagon Road" is a misnomer in more ways than one. First, it does not touch Lake Tahoe at any point, but terminates at the state line, a mile from the lake shore. Second, a hundred automobiles travel over it to one *wagon.*

The greater part of this road is along the old overland stage road over which Hank Monk and other noted pioneer stage drivers piloted their mettlesome half-tamed teams, carrying gold from the mines and no less precious mail to the miners from "back home." This is a portion of the road over which the famous Pony Express was operated in 1860 and 1861, carrying mail from St. Joseph, Missouri, to San Francisco in eight days. The "postage" on letters carried in this way was one dollar.

It is suggested that "Overland State Road" would be a fitting name to apply to this road.

That part of the Alpine state highway from Jackson to Woodfords is strewn with reminders of the tragedies attending the efforts of the pioneers to reach the golden Mecca, over the trail blazed by Kit Carson in 1844. It was along a portion of this trail, up Carson River, through Hope Valley to the summit of the snow-covered range, that Carson guided Fremont on the memorable trip of the latter from Oregon, just before the latter seized California from the Mexican government.



PORTION
OF
HIGH SIERRAS
SHOWING
JOHN MUIR TRAIL
YOSEMITE VALLEY TO MT. WHITNEY

STATE OF CALIFORNIA
DEPARTMENT OF ENGINEERING
SACRAMENTO
1916

W. F. McCLURE STATE ENGINEER

APPROVED W. F. McClure STATE ENGINEER

The John Muir Trail—From Center Basin.

The John Muir Trail—View looking west from Center Basin.
(Photo, W. L. Huber.)

The spot where Carson stood with Fremont on the summit on the 24th of February, 1846, was formerly marked by a sturdy pine tree, upon which the former had cut his name. This tree a few years ago was felled and the portion bearing the name carried away. The old log, badly scarred by relic hunters, still lies upon the ground.

The name "Kit Carson State Road" applied to this highway would be an appropriate memorial to the intrepid scout, guide and Indian fighter, who left his name indelibly engraved upon the pages of California's history.

And so with other roads. Each has some distinction appropriately its own and should bear a name indicative of the part it had in the history-making of the state. With appropriate names they become monuments to commemorate the early history and history-makers of the state.

But one more example will be cited here. The Big Oak Flat toll road, recently acquired as a connection with the Tioga and Mono Lake Basin roads, is distinguished for more romance than tragedy, many points of interest along it having been the scenes depicted in Bret Harte's inimitable stories of mining days. The "Luck of Roaring Camp" was enacted in the territory traversed by it. The road passes within a few yards of the hydraulic pit worked by "Tennessee and his partner" a quarter century after Tennessee had paid the penalty of his fictitious crimes at the hands of an imaginary lynching party. It is said the cabin occupied by Chaffee and Chamberlain, the originals of "Tennessee and his partner," is still standing.

At the session of the legislature in 1913 the matter of giving state roads appropriate names in conformity with the foregoing suggestions was taken up by the parlors of the Native Sons of the Golden West, a patriotic fraternal order composed of native-born Californians. A bill was introduced giving names to certain roads as above indicated, but failed to become a law.

The recommendation is now renewed that a law be enacted providing that all roads constructed from the bond issues be designated as state highways, and all other roads acquired by the state be known as state roads, and that specific names be given to certain of the latter as indicated in the foregoing discussion.

FINANCIAL STATEMENT.

The State Road Engineer submits the following statement of the expenditures made in maintenance and improvement of state roads during the last two years:

Alpine State Road—		
Roadbed construction and improvement of grade and alignment	$19,847 00	
Repairs, improvements and general maintenance	23,800 00	
Machinery, tools and equipment	3,412 00	
		$47,059 00

Auburn-Emigrant Gap State Road—		
Roadbed construction and improvement of grade and alignment	$17,050 00	
Bridges	115 00	
Culverts	119 00	
Rock retaining walls	120 00	
Machinery, tools and equipment	1,165 00	
Repairs and general improvements	2,746 00	
		21,315 00
California Redwood Park State Road—		
Construction, improvements, repairs and general maintenance	$73,582 00	
Machinery, tools, water tanks and equipment	5,210 00	
		78,792 00
Donner-McKinneys State Road—		
Roadbed construction and improvement of grade and alignment	$13,646 00	
Bridges	144 00	
Culverts	113 00	
Rock retaining walls	119 00	
Machinery, tools and equipment	2,087 00	
		16,109 00
Emigrant Gap-Donner Lake State Road—		
Roadbed construction and improvement of grade and alignment	$15,309 00	
Bridges	7,214 00	
Culverts	589 00	
Rock retaining walls	467 00	
Machinery, tools and equipment	2,863 00	
		26,442 00
Kings River State Road—		
Roadbed construction and improvement of alignment	$3,610 00	
Culverts	126 00	
Rock retaining walls	190 00	
Machinery, tools and equipment	209 00	
Repairs and general maintenance	1,823 00	
		5,958 00
Lake Tahoe State Road—		
Repairs, improvements and general maintenance	$42,524 00	
Machinery, tools and equipment	12,500 00	
Buildings	750 00	
		55,774 00
Purchase of timber land along right of way for preservation of trees, as provided by chapter 762, page 15		6,848 40
Lassen State Road—		
Repairs, improvements and general maintenance	$2,699 00	
Machinery, tools and equipment	820 00	
		3,519 00
Myers-McKinneys State Road—		
Roadbed construction and improvement of grade and alignment	$14,367 00	
Bridges	231 00	
Culverts	314 00	
Rock retaining walls	682 00	
Fencing right of way	1,938 00	
Machinery, tools and equipment	1,007 00	
Repairs, improvements and general maintenance	1,054 00	
		19,593 00

PLATE XXXII.

"Culebra Cut" on state highway, 110 feet deep.

(p. 193)

Mono Lake Basin State Road—		
Repairs, improvements and general maintenance	$20,791 00	
Machinery, tools and equipment	550 00	
		21,341 00
Sonora-Mono State Road—		
Repairs, improvements and general maintenance	$10,305 00	
Machinery, tools and equipment	1,100 00	
		11,405 00
Tahoe City-Crystal Bay State Road—		
Roadbed construction and improvement of grade and alignment	$6,583 00	
Bridges	40 00	
Culverts	23 00	
Machinery, tools and equipment	586 00	
		7,232 00
Tioga State Road—		
Roadbed construction and improvement of grade and alignment	$15,250 00	
Bridges	1,500 00	
Culverts	2,675 00	
Rock retaining walls	1,500 00	
Machinery, tools and equipment	2,985 00	
Buildings, fences, etc.	450 00	
Surveys	1,500 00	
Purchase of right of way	3,000 00	
Repairs, improvements and general maintenance	2,425 00	
		31,285 00
Trinity-Humboldt State Road—		
Roadbed construction and improvement of alignment	$3,000 00	
Bridges	7,800 00	
Culverts	600 00	
Rock retaining walls	1,000 00	
Machinery, tools and equipment	1,450 00	
Repairs and general maintenance	8,293 00	
		22,143 00
Surprise Valley Road		20,000 00
Pescadero-Redwood Park Road		10,000 00
Yolo-Lake State Road, surveys		3,000 00
Kern-Ventura State Road, surveys		8,000 00
Pasadena State Road, surveys		7,500 00

THIRTY-THREE MILLION DOLLAR STATE HIGHWAY SYSTEM.

When $18,000,000 was voted by the people, in 1910, for the purpose of constructing a system of first-class highways throughout the state, it was well understood that the sum would be insufficient to provide all of the roads specified in the bill.

This being realized at the beginning by the builders, the policy was followed of adopting a few standard types of construction, adapted to local conditions and the traffic to be accommodated.

The types of pavement used are the following:

Base: Concrete; macadam; asphaltic concrete.
Surfacing: Asphalt; asphalt, Topeka specifications—oiled; thin bituminous.

It has been demonstrated that where a strong well-proportioned base is provided, a thin resilient covering gives comfort to the traveler, resists abrasion measurably well, is easily repaired, and when need arises can be renewed at a low cost.

The bridges constructed for the state highways are models of grace and strength. Many of them are so notable as to have received extensive commendatory notice in the technical press of the country.

When the proposition to vote $15,000,000 more with which to complete the highway system was made, the Automobile Association employed experts to examine the highways constructed, as to location, design and method of construction. The investigations were very thorough and the report approved the work unreservedly. As a consequence the association endorsed the proposed bond issue and worked for its success.

The result of the election upon the question of additional bonds being 405,000 majority in the affirmative seems to indicate that the people of the state approve of the manner in which the $18,000,000 was expended and are determined that California shall be in the vanguard of the march of twentieth century progress.

The $18,000,000 is practically all expended, and it is purposed soon to render a comprehensive account of the stewardship of this big sum. The report will be complete in detail, but as it can not be submitted in full at this time, its presentation will be deferred until the final transactions are recorded.

In the mean time a summary by the Highway Commission of its work to date is presented as follows:.

STATE HIGHWAYS.

By State Highway Commission.

The work of constructing the state highway system under the $18,000,000 bond issue has continued as heretofore under the same personnel. Three members of the advisory board of the Department of Engineering have continued as an executive committee under the designation ''California Highway Commission'' to have charge of the work, and the Highway Engineer of the department has acted as chief engineer and executive officer of the commission.

The $18,000,000 state highway fund is now nearly exhausted and the commissioners have in contemplation the preparation of a report of all work done thereunder, giving a complete account of their stewardship. This report will be made up at the completion of the expenditure of the state highway fund.

At the election in November, 1910, on the $18,000,000 bond issue, out of a total of 173.806 votes, there was a majority in favor of the bonds of 12,786 votes. On November 7, 1916, the voters of California considered a new bond issue of $15,000,000 for state highways. With a total of

PLATE XXXIII.

Top—State highway, Monterey County.
Middle—State Highway, San Benito County.
Bottom—State Highway, San Luis Obispo County.

(p. 194)

679,346 votes cast, there was a majority of 405,132 in favor of the highway bonds, a majority of nearly 4 to 1, and more than thirty times the favorable majority at the election of 1910. This is a showing of the increase of interest in the road problem and must in part at least be considered a vote of approval by the people of the state highways already completed under the $18,000,000 bond issue.

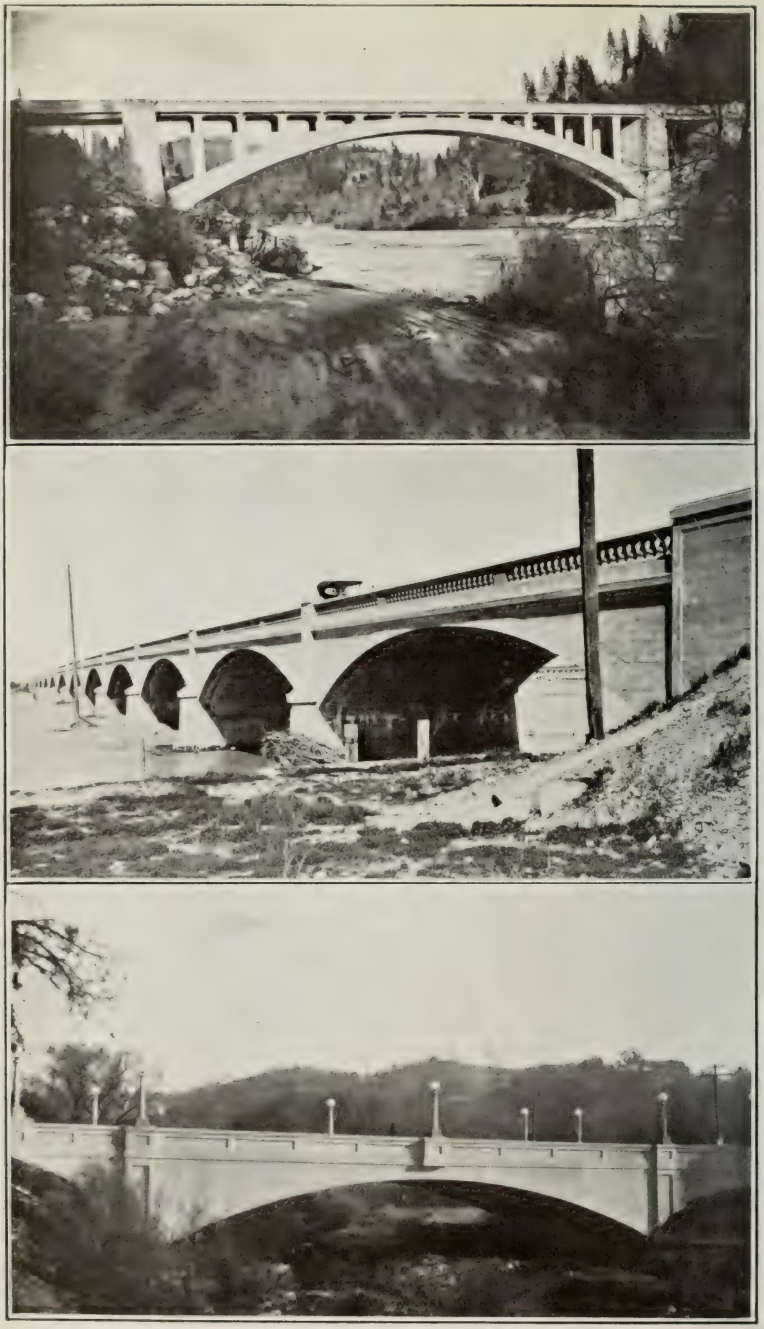
The details of the work under the first bond issue, as already stated, will be included in the final report to be made a few months from now, but a general statement of the extent of the work done during the years 1915–16 is pertinent:

Counties	Concrete		Graded only, miles
	Topeka surfacing, miles	Thin bituminous surfacing, miles	
Alameda		5.83	
Butte		12.98	
Colusa		10.60	
Contra Costa	2.55	5.37	3.47
Glenn		9.40	
Humboldt			6.93
Kings		8.95	
Los Angeles		9.11	
Marin			4.00
Monterey		39.01	
Orange		3.07	
San Benito		5.76	
San Diego		7.23	
San Luis Obispo		9.96	
Santa Barbara			11.38
Santa Clara		8.89	
Shasta			.09
Sonoma		7.01	8.12
Stanislaus		14.23	
Sutter		11.70	
Tehama		6.46	12.74
Tulare		24.03	
Yolo		3.91	
Yuba		3.28	
Totals, miles	2.55	206.78	46.73

The following table shows the mileage built from the beginning of the work to January 1, 1915:

Counties	Concrete bases			Macadam		Graded only, miles
	Asphalt surfacing, miles	Topeka surfacing, miles	Thin bituminous surfacing, miles	Topeka surfacing, miles	Oiled, miles	
Alameda			20.19	5.06		
Butte			12.68			
Calaveras						
Colusa			31.85			
Contra Costa						6.99
El Dorado			6.57		5.27	
Fresno			25.76			
Glenn			15.49			36.41
Humboldt						
Imperial			17.76			
Inyo						
Kern			61.79			10.67
Kings						
Los Angeles			41.18			27.36
Madera			16.78			9.91
Marin			.89			.88
Mariposa						
Mendocino			4.02		7.64	35.18
Merced			34.67			
Mono						
Monterey						
Napa			6.49			
Orange			33.46			6.48
Placer			9.92			
Riverside			9.34			
Sacramento			8.64			
San Benito						4.05
San Bernardino			24.62			
San Diego			42.02			
San Luis Obispo			38.74			3.61
San Mateo	5.41	5.28		5.05	.17	
Santa Barbara		6.48	20.75			18.62
Santa Clara		3.77	43.16	6.43	.08	7.59
Santa Cruz						16.05
Shasta						26.14
Siskiyou						41.55
Solano			34.08			
Sonoma			13.70			4.45
Stanislaus			21.62			1.32
Sutter						
Tehama			8.79			
Tulare						
Tuolumne						21.90
Ventura			31.55			
Yolo			18.10			
Yuba					9.22	
Totals, miles	5.41	15.53	654.61	16.54	22.38	279.16

PLATE XXXIV.



Top—Pit River Bridge.
Middle—Stoney Creek Bridge.
Bottom—Atascadero Bridge.

(p. 196)

PLATE XXXV.

Top—View on state highway in Butte County.
Middle—View on state highway in Alameda County.
Bottom—View on state highway in Marin County.

The state highway routes in a number of counties include a considerable mileage of roads improved by county bond issues or otherwise. The following table indicates such of these improved roads as have been taken over by the Department of Engineering and made a part of the state highway system:

Counties	Concrete base, thin bituminous surfacing, miles	Oiled macadam, miles	Asphaltic concrete, miles	Graded only, miles	Bridges, miles
Sacramento	3.46	41.26			
Alameda		5.44	2.65		
Napa				8.63	
San Joaquin		33.97			
San Benito		6.95			
Santa Barbara		8.50	7.72		
Placer					.16
Humboldt					.49
Mendocino					.19
Los Angeles		39.96			
Totals, miles	3.46	136.08	10.37	8.63	.84

RECAPITULATION.

Concrete base, asphalt surfacing	5.41 miles
Concrete base, Topeka surfacing	13.08 miles
Concrete base, thin bituminous surfacing	864.85 miles
Macadam base, Topeka surfacing	16.54 miles
Macadam base, oiled	158.46 miles
Asphaltic concrete	10.37 miles
Bridges	.84 mile
Graded only	334.52 miles
Total	1,409.07 miles

In addition to the above, there are uncompleted contracts now in progress as follows:

Concrete base—thin bituminous surfacing	77.03 miles
Graded only	76.13 miles
Total mileage of roads in state highway system	1,562.23 miles

The Concrete Type of State Highway.

The commission has developed what may be called its standard type of pavement, consisting of a relatively thin concrete base covered and protected by a thin bituminous wearing coat. The concrete is laid without expansion joints and upon a well consolidated subgrade.

More than nine-tenths of the expenditure for the pavement is placed where the traffic has little chance of destroying the investment. The bulk of the road cost goes into the grading, drainage appliances and a solid concrete foundation. The wear and tear of traffic does not come in contact with this foundation as the concrete is protected by a surface coat of asphalt and mineral aggregate. Such a coat is easily applied and gives a high return in wearing qualities for its cost. This wearing coat does not roll or form ridges and hollows. It adheres firmly to the concrete pavement, and at the end of three or four years it may be renewed by a new coat of asphaltic road oil and rock screenings.

The oldest concrete roads built by the commission have been protected by the thin bituminous wearing coat for nearly four years, and the maintenance cost has been very low.

Some Noteworthy Accomplishments.

During 1915 and 1916 the Highway Commission has completed and thrown open to traffic some constructions that have attracted considerable favorable comment in the engineering publications throughout the United States.

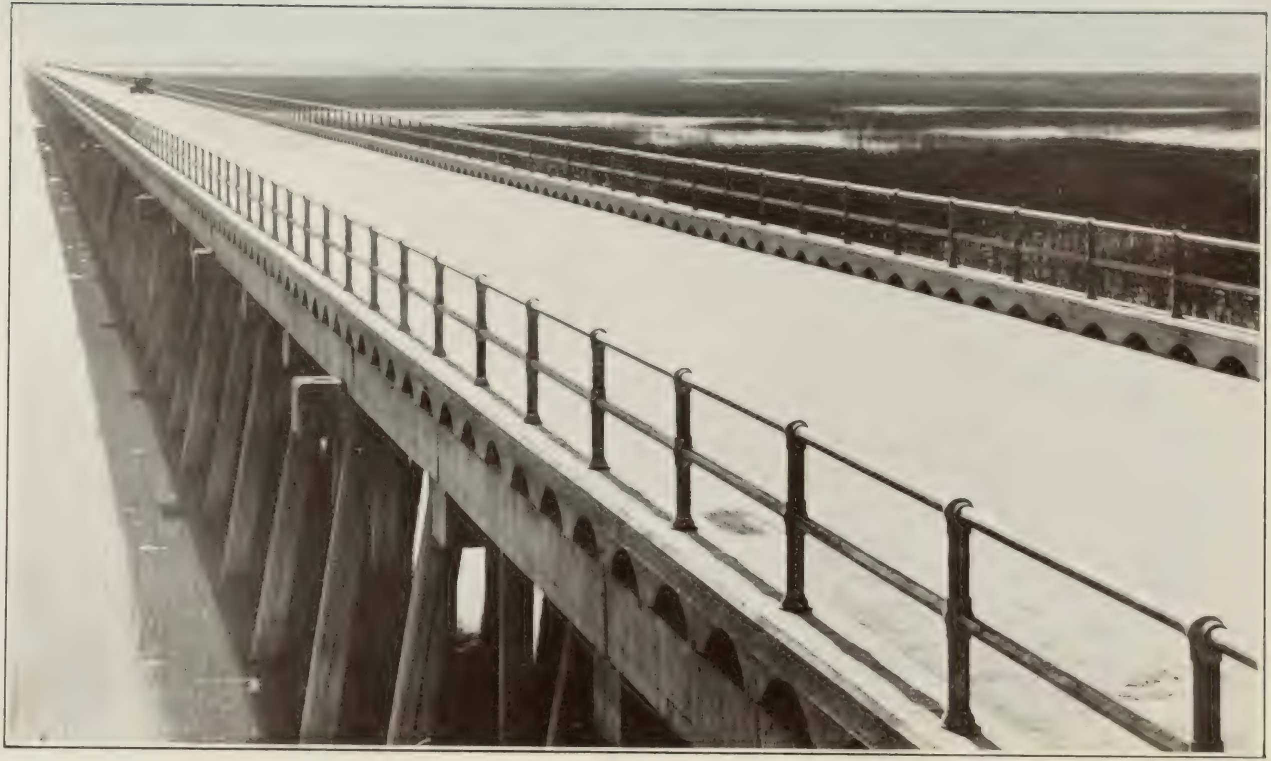
The Ridge route, on the route from Bakersfield to Los Angeles, has cut the mileage between these two cities by about 50 miles. This new route is so much shorter than the line of the railroad that automobile stages make the trip in less than railroad time, and allow a rest and time for lunch about midway between the cities.

In the building of this route through the mountains, nearly a million yards of material were moved on a length of 30 miles of the road.

The Yolo trestle connects the west side of the Sacramento River with the east and south, and is the only all-year-round highway crossing of the waters of the Sacramento River for a distance of 200 miles. This trestle is 3.1 miles in length, the longest concrete highway trestle in the world, and cost approximately $400,000. It was opened to traffic early in 1916.

The New Eel River bridge, south of Scotia, has been completed this month. It was designed by the engineering force of the commission. The bridge consists of two steel spans, each 302 feet 6 inches in length, six concrete spans, each 46 feet 4 inches in length, and the center pier is 100 feet high.

PLATE XXXVI.



(p. 198) Yolo Causeway, on state highway, longest concrete highway trestle in the world, 3.1 miles long.

APPENDIX A.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	STATE ROADS.			
Motor Vehicle	Office expenses	$19,020 48	$7,573 95	$11,446 53
Motor Vehicle	Alpine State Highway	53,886 46	33,432 00	20,454 46
Motor Vehicle	Auburn-Emigrant Gap State Highway	16,500 00	9,063 32	7,436 68
Motor Vehicle	California Redwood Park State Road	12,850 00	8,073 78	4,776 22
Motor Vehicle	Donner Lake Road	14,500 00	4,151 88	10,348 12
Motor Vehicle	Emigrant Gap Road	24,248 03	13,850 83	10,397 20
Motor Vehicle	Kings River Road	4,000 00	998 34	3,001 66
Motor Vehicle	Lake Tahoe Road	53,976 62	43,475 55	10,501 07
Motor Vehicle	Lassen State Highway	6,570 00	2,300 93	4,269 07
Motor Vehicle	Meyers-McKinneys State Highway	22,809 46	15,202 17	7,607 29
Motor Vehicle	Mono Lake Basin State Highway	21,468 58	12,272 51	9,196 07
Motor Vehicle	Sonora and Mono State Highway	7,666 99	5,431 68	2,235 31
Motor Vehicle	Trinity and Humboldt State Highway	20,741 09	18,383 61	2,357 48
Motor Vehicle	Tioga State Highway	27,650 00	16,312 15	11,337 85
468, 1911	Alpine State Highway	2 42		2 42
120, 1913	Alpine State Highway	3 89		3 89
678, 1915	Auburn-Emigrant Gap Road	10,000 00	9,531 57	468 43
398, 1913	California Redwood Park State Road	66,034 00	66,017 23	16 77
619, 1913	Emigrant Gap State Road	26 85	25 72	1 13
121, 1913	Emigrant Gap State Road	07		07
680, 1913	Emigrant Gap State Road	1,694 15	1,690 92	3 23
502, 1911	Kings River State Road	531 30	529 50	1 80
680, 1913	Kings River State Road	2,337 20	1,753 80	583 40
117, 1913	Lake Tahoe State Road — Balance	94	23 05	2 89
	Lake Tahoe State Road — Sale material	25 00		
	Lake Tahoe State Road — Total	25 94		
334, 1911	Lake Tahoe State Road	2 78		2 78
680, 1913	Lake Tahoe State Road	4,035 58	4,029 74	5 84
705, 1911	Lake Tahoe State Road	44		44
762, 1915	Lake Tahoe State Road	7,000 00	115 45	6,884 55
468, 1911	Lassen State Road	136 96		136 96
Allotted by U. S. Forest Service	Meyers-McKinneys State Road	19		19
119, 1913	Meyers-McKinneys State Road	3 39	3 39	
158, 1911	Meyers-McKinneys State Road	60		60
423, 1913	Meyers-McKinneys State Road — Balance			10 96
	Meyers-McKinneys State Road — Credit	10 96		
	Meyers-McKinneys State Road — Total	10 96		
705, 1911	Mono Lake Basin Road	1,130 16	41 10	1,089 05
680, 1913	Mono Lake Basin Road	840 97	464 82	376 15
259, 1915	Muir Trail	10,000 00	4,424 03	5,575 97
764, 1915	Pescadero and Redwood Park Road	10,000 00		10,000 00
116, 1907	Sierra and Downieville Road	86 77		86 77
705, 1911	Sonora and Mono Road	26 49	1 00	25 49
561, 1909	Sonora and Mono Road	6 73	6 73	
765, 1915	Surprise Valley State Road	20,000 00	19,764 42	235 58
680, 1915	Tahoe City to Crystal Bay Road	3,000 00		3,000 00
306, 1915	Tioga State Road	3,000 00	3,000 00	
118, 1913	Trinity and Humboldt State Road	4,949 54	4,831 29	118 25
274, 1911	Trinity and Humboldt State Road	2 93	2 93	
509, 1913	Trinity, Tehama and Shasta Roads	259 22	254 70	4 52
283, 1915	Yolo and Lake Highway	3,000 00	2,059 42	940 58
748, 1915	Bakersfield-Nordhoff Road	8,000 00	13 50	7,986 50
704, 1915	Pasadena-Antelope Valley Road	7,500 00	178 14	7,321 86
144, 1915	Colorado River bridge at Topock	*30,000 00	30,000 00	

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*The Colorado River bridge was constructed by the United States Indian Service, the Department of Engineering only acting in a consulting capacity in checking, amending and approving the plans and accepting the work after completion.

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	STATE ROADS—Continued.			
551, 1911	Rectifying river channels	66,533 12	66,533 12	--------
465, 1913	Rectifying river channels	210,990 12	141,686 95	69,303 17
697, 1915	San Rafael deep water channels (maintaining navigability)	12,500 00	--------	12,500 00
25, 1911	Sacramento River flood control	29 86	--------	29 86
503, 1909	Humboldt Bay survey	499 46	--------	499 46
526, 1911	Mad River bank protection	22,790 01	15,572 60	7,217 41
14, 1901	Restraining debris	50,840 85	8,504 47	42,336 38
742, 1911	Canals and canalization of river	3 47	--------	3 47
502, 1911	Eel River bank protection	595 68	595 18	50
	AGRICULTURAL PARK.			
443, 1913	Barns, sheds, poultry buildings	$13,986 07	$5,160 89	$8,825 18
534, 1911	Dairy buildings and barns	792 33	615 90	176 43
512, 1913	Drainage and sewage	5,331 51	1,875 19	3,456 32
532, 1911	Grandstand	64 22	--------	64 22
201, 1915	Improvement and maintenance	5,000 00	--------	--------
	Spent by Department of Engineering	--------	415 92	
	Spent by Agricultural Society	--------	4,584 08	
71, 1909	Machinery hall	393 63	--------	393 63
531, 1911	Manufacturers' pavilion	602 36	38 24	564 12
533, 1911	Infield walks and improvements	189 82	--------	189 82
221, 1915	Construction, repairs, barns, sheds	5,000 00	444 88	4,555 12
202, 1915	Women's building	30,000 00	11,512 14	18,487 86
Cont. 3	Repairs to Agricultural pavilion	735 00	731 30	3 70
	MILITIA.			
408, 1909, 362, 1911, 468, 1913	Armory, Los Angeles	$5,328 17	$2,345 72	$2,982 45
566, 1911, 469, 1913	Armory, Sacramento	2,320 59	910 14	1,410 45
379, 1909, 549, 1913	Armory, San Francisco	14,359 36	12,802 94	1,556 42
258, 1915	Naval Militia buildings, San Diego	2,500 00	2,171 49	328 51
321, 1915	Armory, Stockton	25,000 00	2,319 15	22,680 85
	SCHOOLS.			
	California Polytechnic.			
511, 1909	Barns	$24 22	--------	$24 22
207, 1911	Dining hall	184 14	--------	184 14
493, 1913	Heating system	10 00	--------	10 00
270, 1911	Power, heat and light	10 21	--------	10 21
291, 1915	Repairs to building and equipment	15,000 00	$14,939 02	60 98
548, 1911	Repairs and improvements	2 63	--------	2 63
492, 1913	Repairs to building	146 49	2 87	143 62
271, 1911	Heating system	4 81	--------	4 81
516, 1909	Poultry houses	05	--------	05
102, 1913	Water system	914 91	621 45	293 46
290, 1915	Water supply	20,000 00	4,959 84	15,040 16
228, 1911	Water and sewer system	23 19	--------	23 19
	Chico State Normal.			
173, 1913	Repairs and additions to heating system	$1,294 55	$1,215 48	$79 07
136, 1911	Passageway	25 31	--------	25 31
224, 1915	Repairs and improvements	5,000 00	3,854 58	1,145 42
393, 1915	Grounds, swimming pool	500 00	--------	500 00
481, 1915	Swimming pool	1,394 47	--------	1,394 47
460, 1913	Repairs and alterations	526 68	222 62	304 06
459, 1913	Water supply	1,759 41	1,641 46	117 95
536, 1913	Street work	75 70	--------	75 70
Cont.	Model rural school	3,500 00	3,438 65	61 35

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	SCHOOLS—Continued.			
	Fresno Normal School.			
207, 1915	Grounds	$9,000 00	$2,595 11	$6,404 89
504, 1911	Grounds	4,553 22	560 03	3,993 19
171, 1913	Temporary buildings	125 12	24 00	101 12
Cont.	Temporary buildings	17 94		17 94
393, 1915	Water supply	5,000 00	1,418 40	3,581 60
393, 1915	Emergency fund	2,000 00		2,000 00
516, 1913	Building and equipment	373,443 33	324,717 00	48,726 33
	Humboldt State Normal.			
204, 1915	Construction and equipment	$20,330 00	$20,240 45	$89 55
	Los Angeles State Normal.			
233, 1915	Improvement grounds	$12,000 00	$10,663 87	$1,336 13
232, 1915	Addition to manual training building	2,500 00	2,373 49	126 51
416, 1911	Building and improvement fund	56,834 84	56,822 83	12 01
428, 1913	Equipment fund	6,012 04	6,012 04	
504, 1913	Bleacher and playground equipment	196 95		196 95
303, 1911	Repairs and improvements	2,356 94	95 09	
	Spent by trustees		2,261 85	
	Preston School of Industry.			
156, 1909	Two cottages	$1,722 19	$1,140 24	$581 95
172, 1913	Cottages	20,608 22	7,608 47	12,999 75
529, 1913	Hospitals	11,991 71	803 29	11,188 42
549, 1911	Concrete floor	702 43		702 43
528, 1913 301, 1915	Repairs	42,902 92	28,027 37	14,875 55
680, 1911	Repairs	45 66	18 87	26 79
522, 1909	Pipe line	2 21		2 21
531, 1913	Addition to trades building	11,867 41	1,251 01	10,616 40
195, 1911	Water system	768 92	213 66	555 26
206, 1911	Water power plant	2,281 74	2,275 41	6 33
Cont. 3856	Club house	1,400 00		1,400 00
	San Diego State Normal School.			
236, 1915	Grounds	$5,000 00	$4,814 11	$185 89
491, 1913	Improvement grounds	65 39	62 04	3 35
524, 1913	Heating plant	18 99		18 99
234, 1915	Repairs and improvements	14,000 00	13,763 21	236 79
490, 1913	Repairs	456 24	441 19	15 05
	San Francisco State Normal School.			
123, 1911	Repairs	$23 98	$1 35	$22 63
421, 1913	Repairs and furnishing	538 48	507 43	31 05
225, 1915	Remodeling buildings	12,000 00	11,790 48	209 52
	San Jose State Normal School.			
219, 1915	Outdoor classrooms	$20,000 00	$16,643 42	$3,356 58
463, 1913	Gymnasium and playgrounds	13 22		13 22
193, 1911	Grounds	138 43		138 43
426, 1913	Repairs	185 54		185 54
243, 1915	Street improvement	20,000 00	10,329 13	9,670 87
192, 1911	Training building	07		07
	Santa Barbara State Normal School.			
295, 1915	Grounds	$6,500 00	$6,489 65	$10 35
299, 1915	Construction and equipment	15,000 00	13,890 62	1,109 38
294, 1915	Repairs	5,000 00	4,480 80	519 20
546, 1911	Main building	283 09	274 53	8 56
547, 1911	Lunch room	4 89	1 16	3 73

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	SCHOOLS—Continued.			
	Ventura State Training School for Girls.			
239, 1915	Commissary building	$7,000 00	$5,567 48	$1,432 52
318, 1915	Cottages	52,500 00	47,311 09	5,188 91
241, 1915	Cottage for males	6,100 00	5,035 78	1,064 22
262, 1915	Drains	7,500 00	7,363 75	136 25
240, 1915	Farm buildings	6,000 00	4,263 84	1,736 16
319, 1915	Garage	2,500 00	1,871 68	628 32
320, 1915	Grounds	7,500 00	5,482 36	2,017 64
401, 1913	Construction and equipment	170,755 72	166,736 54	4,019 18
Cont. 2604	Water system	500 00	-------------	500 00
	Whittier State School.			
238, 1915	Cottages	$60,000 00	$1,695 01	$58,304 99
166, 1911	Cottage	9,964 69	8,427 70	1,536 99
233, 1911	Dairy barn	94 98	81 78	13 20
169, 1911	Electric light plant	3,000 00	-------------	3,000 00
194, 1909	Manual training building	920 93	920 93	
427, 1913	General repairs	2,015 94	1,353 51	662 43
232, 1911	Repiping	771 72	770 49	1 23
317, 1915	Repairs and improvements	20,000 00	18,604 40	1,395 60
Cont.	General repairs	5,000 00	4,989 80	10 20
Cont. 1408	Water system	1,000 00	541 45	458 55
	California School for the Deaf and Blind, Berkeley.			
442, 1913	Dairy barn	$3,149 24	$2,839 41	$309 83
249, 1915	Fire escapes	1,500 00	1,459 67	40 33
248, 1915	Electric wiring	12,500 00	1,832 73	10,667 27
440, 1913	Gymnasium	48,314 40	46,952 71	1,361 69
277, 1915	Heating system	25,000 00	551 68	24,448 32
655, 1911	Manual arts building	12,191 23	53 41	
	By trustees	-------------	11,744 02	
			11,797 43	393 80
514, 1913	Repairs and improvements	340 43	144 22	196 21
247, 1915	Repairs and improvements	8,550 00	7,410 25	1,139 75
251, 1915	Repairs and improvements	4,500 00	4,003 74	496 26
250, 1915	Wells and equipment	4,000 00	20 00	3,980 00
569, 1909	Improvements	2 64	-------------	2 64
523, 1911	Water supply	8 80	-------------	8 80
441, 1913	Machinery and equipment	2,350 00	2,311 42	38 58
	Industrial Home of Mechanical Trades for Adult Blind, Oakland.			
418, 1913	Dormitory	$31,059 55	$30,088 05	$971 50
419, 1913	Floors	102 68	-------------	102 68
245, 1915	Repairs and improvements	4,000 00	3,091 97	908 03
	HOMES.			
	Sonoma State Home.			
208, 1915	Barracks	$10,000 00	$1,477 07	$8,522 93
508, 1913	Cottage for epileptics	16,361 75	16,314 97	46 78
435, 1913	Dormitory	4,779 98	3,786 80	
	Expended by trustees	-------------	934 84	58 34
509, 1913	Building for farm hands	225 30	-------------	225 30
209, 1915	Grounds and roads	5,000 00	2,714 02	1,430 23
	By trustees	-------------	855 75	
436, 1913	Nursery for males, balance	4,107 99		
	Furnishing	1,500 00		
	Net	$2,607 99	2,474 76	133 23
296, 1915	Nursery for girls, appropriation	$25,000 00		
	Furnishing	3,000 00		
	Net	$22,000 00	1,920 59	20,079 41

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	HOMES—Continued.			
	Sonoma State Home—Continued.			
568, 1909	Power house and boilers	$52 66		$52 66
519, 1911	Reflooring	723 34	$163 46	559 88
448, 1909	Manor house	18 73		18 73
434, 1913	Septic tanks	1,973 76	1,972 67	1 09
239, 1911	Water supply	27 60		27 60
433, 1913	Water supply	9,278 41	4,171 36	5,107 05
297, 1915	Repairs and repiping	16,750 00	501 89	16,248 11
Cont. 647	Cannery building	1,295 59	997 57	298 02
Cont. 1121, 1122	Tubercular hospital	3,429 36	70 72	3,358 64
Cont. 1124	Plans for grounds	250 00	52 48	197 52
Cont. 1663	Concrete conduit	2,391 82	2,298 92	92 90
Cont. 778	Water purifier and storage tank	475 04		475 04
Cont. 1287	Electrical apparatus	7 68		7 68
Cont. 1264	Boiler for power house	179 83	1 92	177 91
Cont. 1718	Oil tank	850 00		850 00
	Veterans' Home.			
483, 1913	Amusement, assembly and library bldg.	$14,970 24	$14,785 52	$184 72
214, 1915	Bath rooms in barracks	15,000 00	4,578 08	10,421 92
235, 1911	Cold storage	31 71		31 71
511, 1911	Cottage C	1,792 10	1,693 85	98 25
212, 1915	Cottages	22,500 00	1,165 92	21,334 08
484, 1913	Dairy and cow barns	309 99	269 00	40 99
252, 1909	Water distilling plant	79 82		79 82
216, 1915	Electric wiring	3,500 00	15 12	3,484 88
236, 1911	Fire escapes	255 63		255 63
508, 1911	Grounds and appurtenances	123 82	20 91	102 91
489, 1909	Addition to hospital	67 20	66 30	90
409, 1913	Lavatories	24 65		24 65
410, 1913	Painting	4,350 99	4,314 66	36 33
470, 1913	Pipe line	977 51	580 08	397 43
482, 1913	Repairs to plumbing	4,973 80	3,981 29	992 51
507, 1911	Plumbing	1,000 00	217 11	782 89
215, 1915	Plumbing repairs	10,000 00	1,860 99	8,139 01
508, 1909	Repairs to buildings—			
	Balance $6 72			
	Credits 21 75			
		28 47	18 88	9 59
411, 1913	Repairs to buildings	1,891 84	1,815 09	76 75
509, 1911	Repairs to buildings	967 99	767 17	82
488, 1909	Storehouse and commissary	172 09	63 89	108 20
521, 1911	Septic tanks	1,122 65	247 31	875 34
510, 1911	Surgeon's residence	66 07		66 07
	Maintenance Fund—Installing irrigation and oil pipes	2,500 00	1,759 90	740 10
213, 1915	Repairs	15,000 00	4,441 97	10,558 03
	General Fund to complete surgeon's residence	223 35		223 35
	General Fund—Addition to dining room	189 40		189 40
	General Fund—Addition to power house	152 68		152 68
	General Fund—Cold storage	141 32		141 32
	HOSPITALS.			
	Agnews State Hospital.			
528, 1911	Reconstruction	$1,115 77	$300 45	$815 32
400, 1913	Workers' cottage	41,464 87	34,942 94	6,521 93
473, 1913	Nurses' home	42,700 59	40,402 85	2,297 74
606, 1913	Wiring conduits and repairing steam lines	2,036 73	1,998 39	38 34
754, 1915	Construction and furnishing of patients' cottage or cottages	22,500 00	229 48	22,270 52
Cont. est. 546	Miscellaneous repairs	6 95		6 95

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	HOSPITALS—Continued.			
	Agnews State Hospital—Continued.			
Cont. est. 727, 1914	Installing one 250 horsepower boiler	$45 27	-------------	$45 27
Cont. est. 706, 945, 1913	Imp. of heating system and cooperage	8 57	-------------	8 57
Cont. est. 633, 761, 1203, 1913	Gas holder	158 89	$99 25	59 64
Cont. 946, 1913	Repairs to fan heating system	29 63	13 63	16 00
Cont. 82, 199, 1914	Temporary barracks	32,253 03	31,979 53	273 50
Cont. est. 92	Completion of electric system	1,056 00	1,047 80	8 20
Cont. est. 378, 1915	Changing and refitting old plumbing fixtures and buying and installing necessary new fixtures	1,900 00	1,791 99	108 01
Cont. est. 434, 1915	Completion of steam heating system	2,305 13	1,727 03	578 10
Cont. est. 689, 905, 402, 2832, 1915	For furnishing and installing a clock system as per specifications and bid	7,660 00	22 30	7,637 70
481, 1913	Gas plant	5,498 60	5,494 70	3 90
107, 1913, 149, 1911	Dam and reservoir	6,050 40	3,007 49	3,042 91
125, 1911	Male cottage	261 82	3 60	258 22
220, 1915	Purchase and installation of three electric elevators	7,500 00	97 56	7,402 44
192, 1915	Replacement of a main pipe line and connections thereto and completion of the reservoir and water systems	15,000 00	5,764 29	9,235 71
305, 1915	Plumbing repairs	5,000 00	230 81	4,769 19
Cont. 379,	Assistant physician's residence	398 14	-------------	398 14
Cont. 444,	Salary of B. B. Kinkade	75 33	-------------	75 33
Cont. 553,	Survey of grounds	35 87	-------------	35 87
Cont. 413, 1915	For labor and material for repairs and reinforcement of middle dam of hospital water supply system for irrigation and domestic use	$1,500 00	$927 44	$572 56
669, 960, 1915	For labor and materials for alterations and construction of kitchen and service buildings	14,131 00	6,041 54	8,089 46
670, 1915	Steward's residence	3,000 00	2,424 11	575 89
216, 1914	Labor of J. C. Warren on gas plant	75 00	75 00	-------------
103, 1914	Completion of gas plant	549 01	534 07	14 94
984, 1916	Survey of plumbing, water and steam system	250 00	126 01	123 99
985, 1915	Construction of two gas pipe lines, heaters, services and ranges in the officers' quarters	1,600 00	141 14	1,458 86
986, 1916	Construction of a concrete conduit through the proposed service building	650 00	111 73	538 27
891, 1052, 1916	Cottage for manager and guests	4,500 00	1,998 46	2,501 54
1053, 1916	Inspection of work	1,000 00	453 00	545 00
1058, 1916	Installation of substation equipment, transmission lines, distributing lines and lighting system	8,500 00	480 54	8,019 46
2607, 1916	Remodeling of second floor of administration building	3,000 00	11 75	2,988 25
316, 1909	Water system	26	-------------	26
406, 1913	Steam boilers	703 85	703 56	29
407, 1913	Cottages (Dozier and Chambers)	13,267 81	10,693 46	2,574 35
560, 1911	Cold storage plant	49 99	-------------	49 99
487, 1913	Dairy buildings	13,326 92	12,308 46	1,018 46
486, 1913	Dormitories and sheds	5,922 52	5,488 80	433 72
489, 1909	Female cottage	319 48	-------------	319 48

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1. 1914, and appropriations	Expended	Balance June 30, 1916
	HOSPITALS—Continued.			
	Agnews State Hospital—Continued.			
408, 1913	Steam heating system	$1,321 48	$1,173 09	$148 39
505, 1911	Irrigation	541 99	537 45	4 54
314, 1909	Kitchen	51 99		51 99
405, 1913	Laundry	6,712 66	6,457 67	254 99
404, 1913	North pay cottage	1,193 05	1,946 10	46 95
315, 1909	Receiving and treatment building	34 83		34 83
489, 1913	Reclamation of lowlands	3,959 11	3,178 95	780 16
488, 1913	Rewiring	1,003 74	930 03	73 72
327, 1915	Remodeling south pay cottage	15,000 00	3,927 24	11,072 76
325, 1915	Men patients' cottage	15,000 00	465 96	14,534 04
352, 1915	Repairs and equipment of power house	5,000 00	538 35	4,461 65
324, 1915	Women patients' cottage	15,000 00	1,611 83	13,388 17
326, 1915	Home for working men	15,000 00	800 79	14,199 21
Cont. 765, 805, 1912	Transformers	726 33		726 33
709, 1913	Addition to south pay cottage	3 49		3 49
289	Plumbing—Ward No. 3	67 52		67 52
346, 939, 1045, 1100	Two parole cottages	$172 69		$172 69
504, 722	Laying out of grounds	28 31		28 31
913	Cold storage plant	9 24		9 24
1463, 51, 135	Amusement hall	1,735 40	$1,703 20	32 20
1197	Telephone system	17 26	11 63	5 63
Contingents:				
1329	Light and power system	4 79	4 75	04
1429	Power line	18 37	18 35	02
1618	Pipe covering	2 36		2 36
1620	Alteration of 4 hot water storage tanks	83 05	82 39	66
1683	Heating system	9,609 39	9,606 17	3 22
171, 1914	To finish reclamation of lowlands	1,000 00	694 05	305 95
268, 1914	Repairs to floors	900 00	558 07	*341 95
464, 887, 1915	Remodel bakery and kitchen	6,500 00	5,920 11	579 89
636, 1915	Bungalow for Dr. G. W. Ogden	2,500 00	1,836 45	663 55
783, 2637, 1269, 1915	Replacing roof covering of laundry and making survey of sewer pipe	775 00		775 00
1027, 1915	Drafting and inspection	100 00	75 47	24 53
1449, 1028, 1268, 1916	Tower	2,350 00	35 95	2,314 05
1267, 1916	Alterations of assembly building and construction of classrooms	4,700 00		4,700 00
2214, 1916	Power plant equipment	346 89		346 89
2928, 1916	Cost of bringing sewer line and heating conduit to cottages for men and women patients	850 00		850 00
455, 1913	Site and buildings	159,372 93	158,393 12	979 81
237, 1915	Support and maintenance and erection of additional buildings	195,000 00		
	Support	105,000 00	46,456 05	43,543 95
		$90,000 00		
	Southern California State Hospital.			
461, 1909	Assistant physician's residence	$2 16		$2 16
477, 1913	Four cottages	1,130 98	$359 13	771 85
462, 1909	Dining hall	244 27		244 27
215, 1911	Female cottage	1 85		1 85
457, 1909	Cottage No. 2, females	17 00		17 00
459, 1909	Cottage for females	50 90		50 90
155, 1907	Dairy barns	135 10		135 10
496, 1913	Laundry	16,630 48	16,621 97	8 51
466, 1909	Receiving cottages	65 64		65 64
281, 1911	Power plant	3,887 55	3,779 85	107 70

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*Returned to Contingent Fund.

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1. 1914, and appropriations	Expended	Balance June 30, 1916
	HOSPITALS—Continued.			
	Southern California State Hospital—Continued.			
497, 1913	Reservoir—			
	Balance $206 34			
	Credit 5 20			
		$211 54	$2 66	$208 88
458, 1909	Storm drains	274 71		274 71
		50,000 00		
218, 1915	Construction and furnishing 2 cottages	8,500 00		
		$41,500 00	39,748 98	1,751 02
307, 1915	Water supply	10,000 00	2,223 16	7,776 84
Contingents:				
375, 890	Wiring	4 79		4 79
311	Cottages for physicians	10 80		10 80
454, 957, 1009	Porch for Cottage E	92 25		92 25
455	Porch for Cottage F	103 94		103 94
456	Cottage I	492 68		492 68
731, 960, 1079	Heating system	9,059 55	8,652 88	406 67
871	Heating system	469 78		469 78
66	Cover for reservoir	19 15		19 15
40, 408, 616	Superintendent's residence	11,398 47	11,304 75	93 72
1098, 1916	New chicken yards and equipment	3,500 00	45 58	3,454 42
			39 20	
3304, 1916	Repairing walls of west wing main bldg.	1,500 00	*1,460 80	
499, 1913	Dairy building	†17,145 52	‡1,200 00	
			504 87	
			15,440 65	
414, 1913	Elevators	3,089 93	3,003 84	86 09
127, 1911	Fire protection system	465 35	72 66	392 69
415, 1913	Heating system	424 32	144 59	279 73
197, 1911	Heating system	210 41	18 47	191 94
126, 1911	Sewing room and dormitory	261 48		261 48
243, 1909	Telephone system	1 04		1 04
			2,523 47	
416, 1913	Ward No. 25	22,119 48	19,169 79	426 22
129, 1911	Water system	1,006 98	321 93 §685 05	
211, 1915	Boiler	7,000 00	5,917 20	1,082 80
		30,000 00		
	Furnishing	3,000 00		
210, 1915	Females, convalescent building	$27,000 00	4,345 50	22,654 50
		30,000 00		
	Furnishing	3,000 00		
310, 1915	Cottage for males	$27,000 00	4,113 95	22,886 05
309, 1915	Electric wiring	$10,500 00	$9,829 30	$670 70
300, 1915	Farm buildings	7,000 00	5,173 79	1,826 21
		8,000 00		
	Furnishing	1,000 00		
350, 1915	Two physicians' cottages	$7,000 00	291 95	6,708 05
Contingents:				
1516	Completion of fire protection system	54 57		54 57
410	Plumbing	11 90		11 90
612	Plumbing	12 99		12 99
770, 793	Plumbing	87 76		87 76
854	Inspection of generating plant	13 58		13 58
867, 2150, 1915,	Hot water heater	707 82	704 09	3 73
261, 1914	Completion of elevators	281 00	22 75	258 25

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*Returned to Contingent Fund.

†Equipment.

‡Returned to institution.

§By trustees.

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	HOSPITALS—Continued.			
	Southern California State Hospital—Continued.			
184, 1905, 449, 1913	Cells and walls	$95,162 75	$89,860 73	$5,301 97
447, 1913	Construction of dairy and farm building	2,515 83	1,783 22	732 61
573, 1909	Additional houses	1,347 75	--------------	1,347 75
538, 1909	Boilers	51 35	--------------	51 35
430, 1913	Laundry and equipment	9,841 26	9,190 46	650 80
448, 1913	Repairs	10,686 89	10,448 20	238 69
		--------------	36 16	--------------
451, 1913	Shop buildings and equipment	32,422 83	*32,386 67	--------------
562, 1909	Warden's residence	3,909 92	3,671 14	238 78
199, 1915	Cells and walls and other improvements	32,386 67	30,843 23	1,543 44
273, 1915	Cells and other improvements	37,605 08	21,102 76	16,502 32
313, 1915	New bake oven	5,000 00	--------------	5,000 00
311, 1915	Farm buildings	1,500 00	1,372 25	127 75
312, 1915	Refrigerating plant	6,000 00	1,906 15	4,093 85
315, 1915	Power house, reconstruction and equipment	31,000 00	21,431 06	9,568 94
316, 1915	Repairs and improvements	20,000 00	9,877 46	10,122 54
314, 1915	Warden's residence (to be spent by prison directors)	4,000 00	--------------	--------------
	PRISONS.			
	San Quentin State Prison.			
562, 1911	Cells and walls	$71,244 93	$56,393 91	$14,851 02
539, 1909	Guards' cottages	2,953 78	2,639 99	313 79
		32,000 00	--------------	--------------
	Set aside for directors	21,000 00	--------------	--------------
322, 1915	Repairs and improvements	$11,000 00	4,057 15	6,942 85
228, 1915	Water supply and pumping plant	5,000 00	523 63	4,476 37
	MISCELLANEOUS.			
	Owens River fish hatchery	$38,978 00	$11,812 80	$27,165 20
541, 1913	San Francisco State Building Fund	1,000,000 00	112 04	999,887 96
223, 1915; est. No. 2320	Los Angeles expo. bldg., stairways	3,150 00	169 38	2,980 62
		3,000 00		
	Expended by treasurer	1,500 00		
263, 1915	State Treasurer's office, equipment, etc.	1,500 00	976 47	523 53
532, 1913	State Capitol grounds, conservatory	199 17	153 44	45 73
538, 1913	Elevators, State Capitol building	2,662 95	2,623 10	39 85
	State Library Fund, elevator	7,282 49	7,228 26	54 23
		--------------	*3,468 64	
193, 1915	Governor's residence	5,000 00	655 76	875 60
603, 1913	State Capitol building, painting	5,733 23	5,634 23	99 00
565, 1911	Filing cases	2 57	--------------	2 57
322, 1911	Mission Solano, Sonoma, restoring	109 84	--------------	109 84
480, 1913	Mission Solano, Sonoma, repairs	982 19	29 83	952 36
693, 1915	Mission Solano, Sonoma, curb and gutter	300 00	195 88	104 12
272, 1915	State printing plant, painting	2,000 00	1,997 44	2 56
679, 1915	Greek chapel at Fort Ross, restoration and rebuilding	2,000 00	--------------	2,000 00
705, 1911 40, 1913 680, 1913	Contingent expense, Dept. Eng.	9,012 44	8,963 96	48 48
393, 1915	Contingent expense, Dept. Eng.	17,500 00	15,528 94	1,971 02
705, 1911	Contingent expense, Dept. printing	955 67	--------------	955 67
680, 1913	Contingent expense, Dept. printing	2,915 07	1,839 56	1,075 51
393, 1915	Contingent expense, Dept. printing	2,500 00	275 42	2,224 58

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*Reappropriated.

APPENDIX A—Continued.

Expenditure on Appropriations November 1, 1914, to June 30, 1916.

Chapter	Name of job	Balance Nov. 1, 1914, and appropriations	Expended	Balance June 30, 1916
	MISCELLANEOUS—Continued.			
393, 1915	Emergency fund, drafting	$16,000 00	$364 68	$15,635 32
		*12,000 00		
		*612 90		
	Three architectural draftsmen	$11,387 10	5,387 10	6,000 00
393, 1915	General appropriation	4,200 00		
		*214 50		
	One testing engineer	$3,985 50	1,885 50	2,100 00
393, 1915	General appropriation	5,400 00		
		*275 80		
	One mechanical engineer	$5,124 20	2,424 19	2,700 01
393, 1915	General appropriation	7,200 00		
		*367 70		
	Two filing clerks	$6,832 30	3,232 26	3,600 04
393, 1915	General appropriation	3,000 00		
		*153 20		
	Blue-print pressman	$2,846 80	1,346 77	1,500 03
393, 1915	General appropriation	6,000 00		
		*306 40		
	Two clerks and stenographers	$5,693 60	2,693 54	3,000 06
393, 1915	General appropriation	1,800 00		
		*91 95		
	One porter and messenger	$1,708 05	808 05	900 00
	COOPERATIVE RESEARCH.			
704, 1909	Topographic survey—			
	Appropriated July 1, 1915	$14,000 00	$10,118 01	$3,881 99
	Appropriated July 1, 1916	14,000 00	13,867 94	132 06
704, 1909	Hydrographic survey—			
	Appropriated July 1, 1915	9,000 00	8,999 97	03
	Appropriated July 1, 1916	9,000 00	8,170 22	829 78
704, 1909	Irrigation (Adams) survey—			
	Appropriated July 1, 1915	7,000 00	6,995 60	4 40
	Appropriated July 1, 1916	7,000 00	6,725 46	274 54
		$60,000 00	$54,877 20	$5,122 80

*Paid direct.

STATE OF CALIFORNIA
DEPARTMENT OF ENGINEERING

APPENDIX B

Being a Reprint of Bulletin No. 2, issued
by the Department of Engineering, 1916

Irrigation Districts in California

1887-1915

By FRANK ADAMS, Irrigation Manager
Office of Public Roads and Rural Engineering
United States Department of Agriculture

(Based on data gathered under cooperative agreement between the Office of Public Roads and Rural Engineering of the United States Department of Agriculture and the California State Department of Engineering.)

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PREFACE.

Irrigation Districts in California, 1887–1915, a historical sketch of the operations of the Wright Irrigation District law with descriptions of the 49 districts formed under that law, their successes and failures, together with an account of the amendment of the Wright law in 1897 and subsequently, and of operations under the amended law, compiled by Frank Adams, was published as Bulletin No. 2 by the State Department of Engineering early in 1916. The demand for the book was so great that the edition was exhausted in a very short time, and in order to satisfy several hundred requests for it the matter is here reproduced as an appendix to the biennial report of the department.

In order to fully understand why so few of the districts were not successful it is only necessary to carefully read their individual histories as set forth herein, when it will be seen that many of the failures were not due to inherent defects of the law.

The list of court cases affecting irrigation districts appearing in Addendum III, page 133, will be found useful to the student of irrigation law, and Addendum IV, giving an outline of the present irrigation district law, will answer many questions occurring to the proponents of new districts.

A careful perusal of the entire document is commended to all who are interested in the promotion of irrigation under any district or cooperative plan.

The text of this history was completed in 1915, and gives conditions as they existed at that time. The entire text is preserved as published in Bulletin No. 2, but where important conditions are known to have changed, or new districts organized, mention of which does not appear in the text, the omissions will be found supplied in appropriate foot notes.

An exception to this rule is the map of California appearing opposite page 60, and showing the location of all existing districts, which is brought up to date as of November 30, 1916.

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IRRIGATION DISTRICTS IN CALIFORNIA, 1887-1915.

INTRODUCTION.

The irrigation district is now an established institution in California. First authorized in California on a comprehensive basis in 1887, after an agitation in favor of neighborhood irrigation extending over at least fifteen years, and with extreme bitterness toward riparian proprietors, following the decision in *Lux* vs. *Haggin,* probably furnishing much of the motive force that carried the Wright act of 1887 through the legislature, it has been found to be a workable and desirable plan for community ownership and operation of irrigation works. It is not the form of irrigation organization that is numerically strongest in California, nor is it very likely to attain numerical precedence over the cooperative or mutual irrigation company. Neither is it the form of organization under which the largest acreage is now irrigated in this state. It is, however, the form of organization that is now most generally considered both for new and for the reorganization of old irrigation development in California, as it is the form that has been most largely employed in this state in the more important new irrigation development and reorganization of the present decade.[1]

The irrigation district idea did not originate in California. Prior to the passage of the Wright act, Italy, France, and Spain had provided for neighborhood irrigation systems to which the district plan is somewhat similar. Municipal organization had also been employed in drainage. The first irrigation district legislation in the United States was passed by Utah in 1865. That legislation provided that county clerks, on application of a majority of landowners in areas proposed to be organized, should create districts. In those districts landowners were the electors, if land taxes were to be levied, or taxpayers, if general property taxes. A few districts were formed under that act, but nothing important was accomplished. The first California irrigation district act was passed in 1872, "An act to promote irrigation by the formation of irrigation districts." It provided that owners of lands desiring to irrigate or drain them might petition the county supervisors for the formation of irrigation districts. It was required, in the case of any proposed district, that the petition should contain a description of the land, the names of the landowners, and the names of three persons whom it was desired should serve as trustees for the first three months. After verification and publication of the petition the supervisors were required to grant it. By-laws, powers of trustees, reports, and assessments were briefly provided for. The law was inoperative. In 1874 an act was passed, applicable only in Los Angeles County, providing for the office of county superintendent of irrigation, whose duty it should become, upon petition of a majority of the property owners in any given area, to examine the plans and the feasibility of any irrigation system proposed therefor, and thereupon to notify the county supervisors, who should then call an election upon the question of taxation for the construction of irrigation works, and the election of water commissioners, only taxpayers being permitted to vote in any such election. There was no organization under that act. In 1876 another special act was passed creating the Westside Irrigation District. That law provided for five commissioners, an assessor, a collector, and a treasurer. It further provided for issuing 20-year 8 per cent bonds to the amount of $4,000,000.00, to be redeemed by direct tax levy, and to be a lien upon the lands within the district. Surveys were made for a canal from Tulare Lake to Antioch, but all effort under the act soon lapsed. A final special act, creating Modesto Irrigation District, covering the area now generally embraced in Modesto and Turlock districts, was passed in 1878. That act provided that direct taxes should be levied only for repairs and that the construction fund should ultimately be secured from the increase in the gross tax receipts expected to follow a contemplated rise in land values. The credit of the state and of Stanislaus County was pledged for the payment of bonds up to $500,000.00. As in the case of previous special acts, nothing substantial resulted from that one.

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[1] This report deals only with irrigation districts organized under the original Wright act of 1887 and the act of 1897 as amended to 1915. Three additional district acts were passed in 1913, but these were drawn to meet special situations and should not be confused with the general California irrigation district act. These special acts were as follows: Statutes 1913, chapter 370, providing for the organization of county irrigation districts (changed by Statutes 1915, chapter 39, to county waterworks districts) and intended to facilitate water distribution for irrigation purposes from the Los Angeles aqueduct; Statutes 1913, chapter 387, providing for the organization of water districts and intended to facilitate organization of a large desert area along the Colorado River in Chuckawalla Valley; and Statutes 1913, chapter 592, providing for the organization of county water districts. Several districts have been organized under the first of these acts but there has been no organization under the other two. Statutes 1915, chapter 621, known as the "California Irrigation Act," another act designed to meet a particular situation, authorizes irrigation districts to reorganize under it, but no such reorganization is now contemplated by existing districts.

The period of the seventies and eighties in California was one of intense interest in and of great controversy over irrigation. The spirit of development was widespread, but large landowners and riparian proprietors seemed generally to be arrayed against agitation for community endeavor. When the office of state engineer was created in 1878, one of the chief duties of the state engineer was the study of irrigation, and in his first important report, presented in 1880, he outlined an act governing the formation of irrigation districts. For the first few years following, efforts in behalf of irrigation legislation seem mainly to have been directed toward the enactment of a general irrigation law for the state, and against riparian owners. In 1886, however, Mr. C. C. Wright, a lawyer of Modesto, who for some years had been carefully studying irrigation and who was familiar with progress in Europe and elsewhere, and who, also, represented a typical San Joaquin Valley community striving to obtain an irrigation water supply and to construct a community irrigation system in spite of opposing large landowners, was sent to the legislature expressly, it has been said, to procure the passage of a law under which such communities as his own could build and operate their irrigation works. For ten years progressive farmers in Stanislaus County had been advocating the construction of an irrigation system to permit of substituting irrigation farming for the grain farming that had already begun to be unprofitable. They had not, however, been able to agree on any plan. The only hope seemed to lie in a law under which the opposing minority could be forced into compliance with the will of the majority, and to pay their just proportion of the cost. The decision in *Lux* vs. *Haggin* had just been rendered and advocates of irrigation by appropriation were ready to join enthusiastically in any measure that promised relief.

The irrigation district act passed by the legislature of 1887, known as the "Wright Act," remained on the statute books for ten years, with important amendments, drafted in the light of experience, adopted in 1889, 1891, 1893, and 1895. In 1897 it was rewritten, considerably enlarged, and re-enacted as an entirely new act, variously known as the "Bridgford Act," the "Irrigation Act of 1897," and the "California Irrigation District Act." Many further amendments have been made from time to time, and numerous supplemental acts have been passed, as well as a number of acts, relating individually to the various districts that have been organized. The more important of the recent amendments and supplemental acts have had to do with financial aspects and state control.

Entirely aside from any value that may be attached, from an academic standpoint, to a rather full statement of an important movement in the economic development of the state, the value of a study of California irrigation districts is believed to be twofold. The disastrous mistakes made under the original California irrigation district act brought a tremendous economic loss to California, and a knowledge of those mistakes is the most effective preventive of a repetition of them. Secondly, irrigation districts are as a rule organized by people unused to effective business management, and the large general interest the state has in fostering right development warrants furnishing to those who are operating, or who contemplate organizing irrigation districts, whatever assistance available means will permit.[1]

THE WRIGHT ACT OF 1887.

Briefly stated, this act sought to confer on farming communities powers of municipalities in the purchase or construction and the operation of irrigation works. Those powers included the right of eminent domain, the right to issue bonds against all of the real property within any area organized into an irrigation district, and the right to tax that property for the payment of the cost of any irrigation works acquired or built, and of their operation. "Fifty, or a majority of freeholders owning lands susceptible of one mode of irrigation from a common source, and by the same system of works," were authorized to propose the organization of an irrigation district before the board of supervisors of the county in which the lands included should be located. All electors in the area included were allowed to vote at district elections, but it was provided that at least two-thirds of all of the votes cast at an organization election should be favorable to organization in order to carry it, that a majority of all the votes cast at bond elections should approve the bonds submitted before they could be issued, and that two-thirds of all votes cast at elections on special assessments should approve such assessments before they could be levied. Full provision was made for the conduct of district elections, for meetings of boards of directors, and for their management of district business, for the issuance and sale of bonds, for the levying, equalization, and collection of assessments, including the sale of property for district taxes and its redemption within twelve months from date of sale, for the adoption of plans of works and for their construction, for the payment of all district expenses, etc. Boards of directors were given full authority to call special district elections on both the questions of issuing bonds and of levying of special assessments. District bonds were made payable in installments from the eleventh to the twentieth year after issue and were to bear

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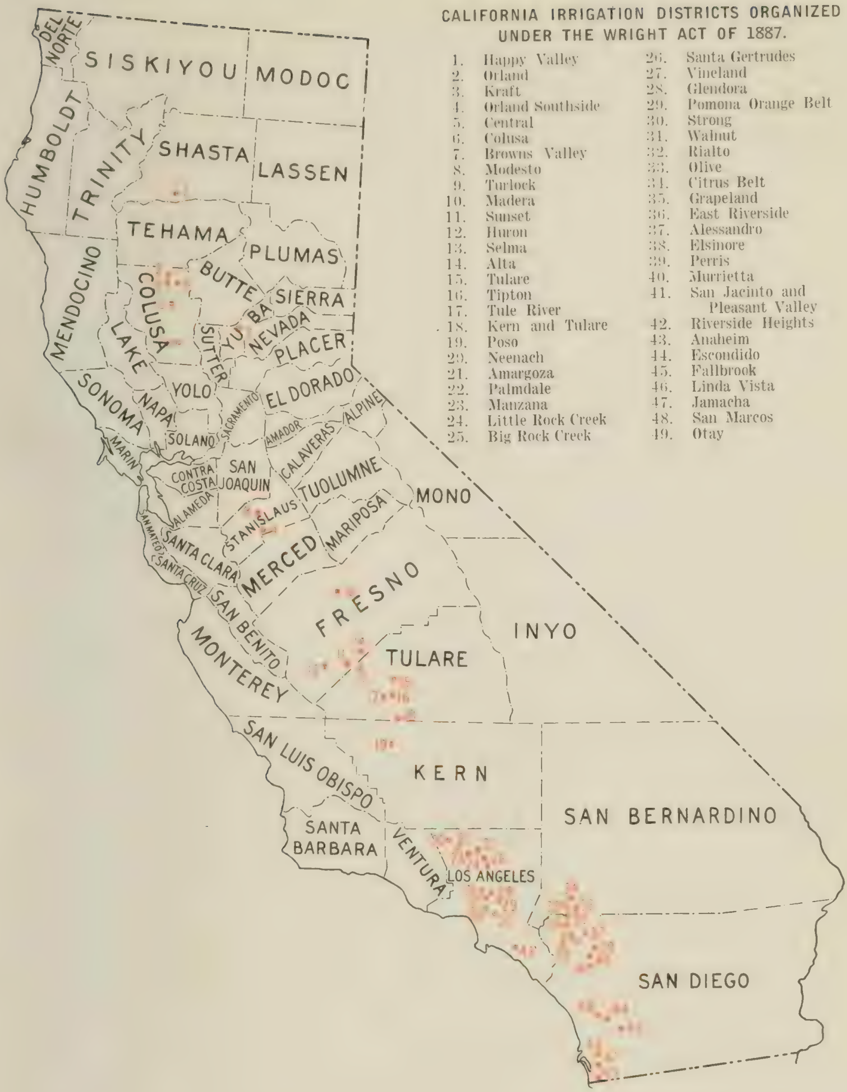
[1] The data presented in this report have been gathered from time to time, during a period extending over fifteen years, and to an extent that might not have been warranted in connection with a movement less closely related to the agricultural development of the state than the irrigation district movement has been, and still is. Many connected with the early history of districts organized under the Wright act, and from whom data were obtained by letter or by personal interview fifteen years ago, are no longer living, and while all of the information gained from them and others could not be included in this report, as complete histories of each of the forty-nine Wright districts formed as the available data have made possible have been filed with the State Department of Engineering at Sacramento. The writer has been assisted from time to time in gathering data about the old districts by the following: Wells A. Hutchins, R. M. Gidney, A. L. Cowell, Miss M. J. Shields, H. J. Quayle, and Harry Barnes. Mr. Wells A. Hutchins has also assisted materially in reviewing court decisions affecting irrigation districts, and the irrigation district legislation passed in California.

PLATE I.



Sketch map of California showing location of irrigation districts formed under the Wright Act of 1887.

interest at the rate of 6 per cent, and it was provided that bonds should not be sold for less than 90 per cent of their face value. In short, the act sought to clothe farming neighborhoods desiring irrigation with full authority at law to acquire by condemnation or otherwise all water rights and irrigation works that a majority of the freeholders and two-thirds of the electors voting in any district election in such neighborhoods should decide in favor of, with the taxing power of the state conferred upon such neighborhoods for financing their acquirement and operation.

ACTIVITIES UNDER THE WRIGHT ACT.

Organization of irrigation districts followed quite rapidly after the passage of the Wright act. The act was approved March 7, 1887, and before the end of that year Turlock, Modesto, Orland and Central districts had been formed, in the order named. Seven organized in 1888, including Browns Valley, Madera, Alta and Poso; six in 1889, including Tulare, Anaheim and Escondido; eleven in 1890, including Selma, Rialto and Perris; thirteen in 1891, including Sunset, Tipton, Alessandro, Fallbrook, Linda Vista and Otay; three in 1892; four in 1893, including Walnut; and the last, Amargoza, in 1895—in all forty-nine. From 1887 to 1893 petitions were also filed for the formation of ten more, in five of these cases the question of organization reaching a vote and being defeated.[1]

Because so few of the districts organized under the original Wright act succeeded and because so many were colossal failures, an impression has grown up that nearly all of them were speculative and fraudulent and that practically all defaulted. If this impression were justified it might not be considered in the interest of irrigation district development to delve too closely into their history, but rather to pass them over as of no live interest at this time, even at the expense of covering up an interesting phase of California economic history. But a careful study of all of the facts available fails to support such an impression. Dishonest and fraudulent districts there undoubtedly were—districts wholly speculative and with neither physical nor agricultural, nor even moral, justification. Nevertheless, in spite of the speculation and the dishonesty and the repudiation of some of the districts, and also in spite of the fact that only eight districts out of the forty-nine organized are now operating, the movement embodied in the irrigation districts organized from 1887 to 1895 was in its final results essentially constructive and forward, and as such is full of suggestion to those concerned in irrigation managed under the district form of organization.

A statistical list of the original Wright irrigation districts is given in the addenda. It does not seem wise twenty to thirty years after they were organized to attempt to classify them according to their feasibility. Some that were not feasible when organized would be feasible now. A number would have been feasible on a much smaller scale than attempted. Some had hardly an element of justification. Some were entirely feasible and still failed from general adverse conditions. One or two of those still active have never really succeeded.

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[1] A list of these proposed districts is given in the addenda.

Nor does it seem conclusive to classify these districts geographically, or according to their success or failure. While those organized in Sacramento and San Joaquin valleys, for instance, were mostly free from grossly speculative features, and while many of those organized in southern California were of a directly opposite nature, districts formed in all three of these general subdivisions of the state had important features and interests in common.

In order to learn the most from these old districts it therefore seems best to consider them from the point of view of what seems to have been their purpose. Thus classified they might be grouped about as follows:

Districts essentially nonspeculative and formed to meet a bona fide demand for new irrigation works: Orland, Kraft, Orland Southside, Central, Colusa, Browns Valley, Modesto, Turlock, Huron, Tipton, Tule River, Kern and Tulare, Poso, Amargoza, Neenach, Palmdale, Pomona Orange Belt, Olive, Grapeland, East Riverside, Elsinore, San Jacinto and Pleasant Valley, Riverside Heights, Escondido, Fallbrook, San Marcos, Otay. (27)

Districts essentially nonspeculative and formed wholly or largely for reorganization or improvement of existing systems: Happy Valley, Madera, Selma, Alta, Tulare, Santa Gertrudes, Vineland, Glendora, Strong, Walnut, Anaheim. (11)

Districts essentially speculative: Sunset, Manzana, Little Rock Creek, Big Rock Creek, Rialto, Citrus Belt, Alessandro, Perris, Murrietta, Linda Vista, Jamacha. (11)

Nonspeculative Districts Formed to Meet a Bona Fide Demand for New Irrigation Works.

Of the twenty-seven districts placed in this group, many offer but little, if anything, of particular interest. Orland, Kraft, Orland Southside, and Colusa were merely unsuccessful attempts to accomplish what all of the smaller and many of the larger resident farmers wanted, but against which there was sufficient opposition to prevent conclusive action. In the main they were merely ahead of their time and victims of neighborhood lethargy and bickering. A portion of the land included in Orland, Kraft, and Orland Southside districts, and the water supply they counted on, are now embraced in the Orland project of the United States Reclamation Service. Huron, Tipton, Tule River, Kern and Tulare, Amargoza, Neenach, Palmdale, Pomona Orange Belt, Elsinore, San Jacinto and Pleasant Valley, Riverside Heights, Fallbrook, and San Marcos districts but represented ill-advised efforts to obtain water where in most instances there was no sufficient or stable supply. Olive covered only a very small area which, after confirmation of the organization and the bond issue voted, it was later thought best to supply with water by other means than a district organization. Grapeland district was prevented from consummating its plans largely through inability to obtain title to its proposed water supply in advance of undertaking development. It spent a large amount of money in the light of the best engineering data available, and about 1,000 acres of orchard is said to have been planted in the faith that the district would succeed, but an adverse court decision gave others superior rights to 2,700 inches of water from Lytle Creek and the district failed. Bonds traded by this district for groceries were later held invalid. East Riverside district had all of the elements of success, was efficiently managed, built one of the first irrigation pumping plants in California, and has been eminently successful as an irrigation venture, but owing to difficulties in collecting district taxes before irrigation water was made available, defaulted its bond interest and found it best to reorganize into the Riverside-Highlands Mutual Water Company. All of the land of the old district is now watered by that company and the value of citrus groves established on that land is estimated by a well-informed banker at $2,000,000.00.

CENTRAL.

This district was organized November 22, 1887. Entirely feasible physically it was still a disastrous failure because of the legal and financial troubles that beset all of the districts in the early nineties, but most of all because the forced irrigation of the great holdings included, averaging 870 acres for the entire district and with forty owners holding an average of 2,225 acres each, could not possibly succeed under settlement conditions existing then or even now.

The petition for the formation of Central irrigation district was signed by 64 (supposed) freeholders and was accompanied by the objections of nine nonresident landowners whose attitude in a way seems now to have forecasted the failure of the undertaking. Still engaged in the ''bonanza'' grain growing of the earlier and more remunerative period when both yields and prices were higher, they conjured up visions of ruin with the bringing in of irrigation water. Irrigation would be bad for fruit, they said. It would even produce chills and would be a detriment to alkali lands. And besides, the irrigation of wheat and barley was not a success, anyway. All of the lands included, they averred, were not irrigable from the same source, the boundaries of the district were improperly described, and the Wright act was unconstitutional. Further, these objectors intended in the near future to include their lands in an irrigation district of their own which would include their residences so that they would have a voice in the proceedings. When election time came the opposition mustered only 51 votes out of 322 and organization prevailed.

Unlike many of the Wright districts, Central irrigation district started with a relatively complete engineering outline. The estimated cost was $638,900.00, and to meet this cost a bond issue of $750,000.00 was authorized by a vote of 189 to 36.[1] Bonds to the amount of $150,000.00 are said to have been sold for cash and for a time the district had ample funds with which to meet contract installments. The market for bonds, however, soon became sluggish, and there were no buyers. Therefore, outside of small blocks given for engineering and legal services, rights of way, and preliminary purposes, the balance of the issue was mainly turned over to the superintendent of construction by nominal sale and by him disposed of to contractors on the best terms he could get. In these various ways a total of about $570,000.00 of the bonds were put out. While the method of financing construction that was adopted carried the work forward for a few years, the time came when contractors would no longer accept the bonds, and in order to bolster up the market a special report on the project was made in 1891 by a consulting engineer of wide reputation who was then largely engaged in reporting favorably on California irrigation districts. The district still remained, however, in financial distress, the opposition continuing their fight against it. In October, 1893, in order to clear up legal uncertainties and thus to stimulate bond sales, the district board brought confirmation proceedings under the then recently enacted statute permitting such proceedings. The superior court granted the confirmation sought by the directors but the old opposition, now ninety-one strong, appealed to the supreme court and finally succeeded in obtaining a decision that the organization proceedings of the district were illegal and null and void.[2] In a previous case[3] Central irrigation district had been upheld, but on other grounds, the correctness of which

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[1] In 1891 the estimated cost was raised by the consulting engineer to $940,364, and an additional bond issue of $250,000 recommended. The justification for this increase was said to lie in the omission of allowances for organization, rights of way, and litigation in connection with construction, the three items amounting to $181,000; in an increase in the cost of excavation from 8.5 and 8.75 cents per cubic yard under the first contracts to 13.5 and 15.5 cents in 1891, and to unexpected and excessive costs of rights of way, in one case reaching as high as $212 per acre, with the usual rates $50 to $70 per acre.

[2] *In re Central Irrigation District*, 117 Cal. 382.

[3] *Central Irrigation District* vs. *De Lappe et al.*, 79 Cal. 351. In this case *mandamus* was sought to compel the secretary of the district to sign the bonds, one of the property owners of the district being allowed to intervene. A number of objections to the district were raised, including objections to the description of the district in the organization petition, to the form of the bond filed by the petitioners, to the manner of publishing the petition, to modifications in the district boundaries made by the supervisors, to the manner of publishing the proclamation of the organization election, to the time of establishing the voting precincts, and finally to the form of the bonds. All of these questions were decided favorably to the district both in the lower court and on appeal.

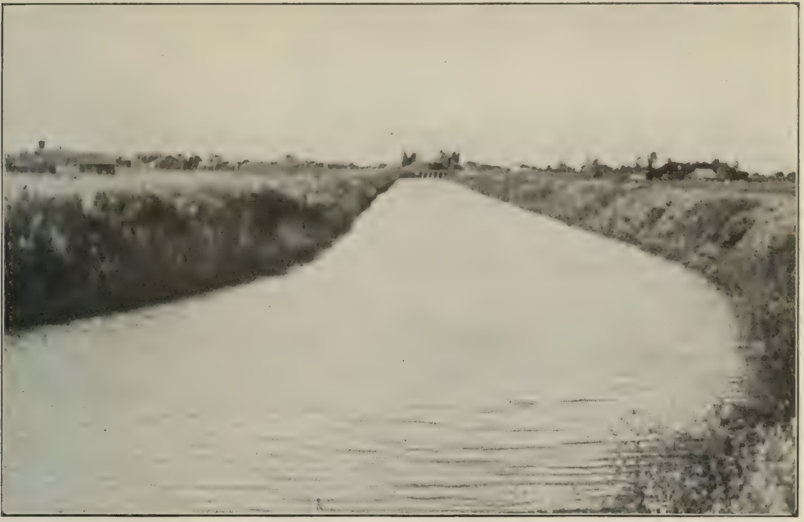

Fig. 1.—Central Canal, originally built by Central Irrigation District, as reconstructed near Willows.

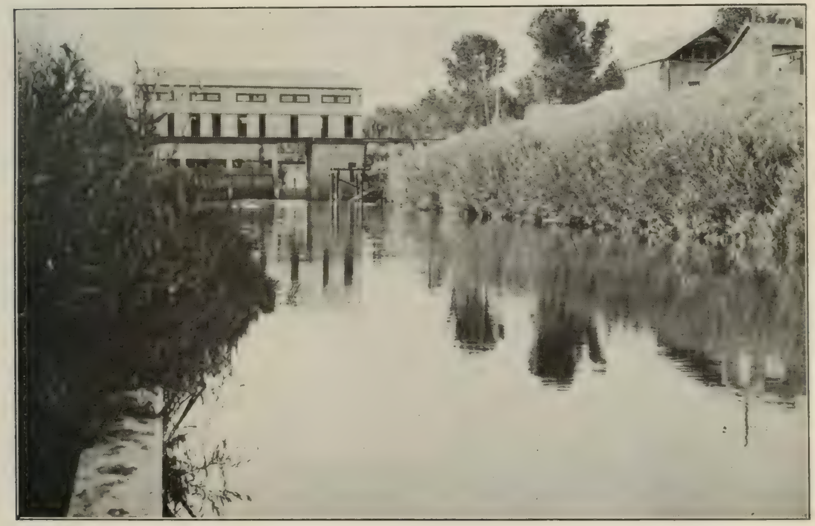

Fig. 2.—Pumping Plant of Sacramento Valley Irrigation Company at head of Central Canal.

was not questioned in the later case. The main points of the later decision were that the organization petition of 1887 was not properly signed, and that the signers of an organization petition must be *bona fide* owners of agricultural lands desiring to improve their lands by irrigation, and not merely the owners of town property and lots, as was the case with many of the signers of the Central irrigation district petition. While holding that bond sales made subsequent to this decision would be null and void, the validity of bonds already issued was not considered. In conformity with the decision the matter went back to the lower court and the new decree of the lower court, rendered March 1, 1902, was never appealed.

The adverse decision of the supreme court above cited put an end for all time to any thought of continuing the old undertaking, and outside of a brief formal activity in 1902 and 1903, for the purpose of leasing Central canal, no effort has been made to revive the old organization. Work on the system had practically ceased by 1891. At that time, while about 40 miles out of a total of 61.35 miles of main canal planned had been built, the system was not continuous and so could not be utilized; nor had any headworks been constructed, thus preventing the running of water in the portion of the canal that was ready to receive it. The leasing of Central canal January 6, 1903, had for its purpose the placing of the old district system in the hands of interests that proposed to utilize a portion of it for conveying water to lands along Sacramento River wholly or largely lying outside of the old district. This lease was made to W. M. Sheldon and was for a term of 50 years. Some years previously, but after the failure of the district, E. D. Beckwith had made filings on Sacramento River and had planned to utilize a portion of Central canal in connection with his appropriation. Lacking capital, he interested Sheldon, and these two, after the execution of the lease of the canal, formed the Sacramento Canal Company, which later was taken over by the Central Canal and Irrigation Company, and finally by the Sacramento Valley Irrigation Company. From this point forward the history of Central irrigation district becomes merged with the history of the Sacramento Valley Irrigation Company and of its subsidiary, the Sacramento Valley West Side Canal Company.[1] When these companies were organized it was supposed that Central irrigation district was finally entirely eliminated, in so far as its legal existence was concerned. The Sacramento Valley Irrigation Company gathered up most of the widely scattered bonds at a cost to it of 35 cents on the dollar, including accrued interest, and as one of the conditions of options secured on a large acreage of land in the old district, it agreed to guarantee lands not purchased under such options against any lien for these bonds. Later a compromise was sought to be entered into with the landowners by which certain concessions should be made to the company in rights of way and certain other matters, in return for the destruction by the company of all of the old bonds held by it. Litigation brought on by those opposing this compromise, however, has entirely upset previous theories as to the existence of the old district and as to obligations incurred by the new company in taking over the old Sheldon lease from the district and a congressional grant of a right to divert 900 cubic feet of water per second from Sacramento River obtained by the Central Canal and Irrigation Company April 16, 1906. The final decision in this litigation, rendered by the supreme court April 29, 1915,[1] held among other things, that lands within the old Central irrigation district constitute the primary territory to which the original public use contemplated by the district and by the grant of congress extends and continues, and that when demanded such lands must be served with water from the new system before it can lawfully be taken for use on outside lands. Thus at this late date the old district comes in to complicate operations of the new companies that were organized on the theory that the old district was no longer of moment and could not in any way limit the delivery of water to the lands outside of it purchased and later largely sold by the various companies succeeding Sheldon and Beckwith. An even later decision of the California Railroad Commission, rendered June 14, 1915, that holds the Sacramento Valley West Side Canal Company to be engaged in public service, while not in any way affecting the old district, so changes the basis of water distribution by the new companies that ultimate entire reorganization, probably under one or more new districts, now seems altogether probable.[2]

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[1] Through the agency of these two companies Central canal has been reconstructed and extended, water has been made available to approximately 100,000 acres of land, and a considerable irrigation development, including irrigation by pumping from wells, has taken place. Settlement, however, has not progressed very rapidly, and further reorganization, after financial difficulties, is now in process.

BROWNS VALLEY.

Browns Valley irrigation district was started and its construction undertaken without adequate engineering study. A first issue of bonds in the amount of $110,000.00 was hastily voted and ''sold'' to a dummy purchaser (said to have been a janitor in a San Francisco bank) and by him traded to contractors at a reported price of 60 cents or less on the dollar. A second issue of $30,000.00 voted in 1892 was similarly disposed of, the net result from the two issues being headworks in North Yuba River, nine miles of flume, twenty-five miles of main canal, and some miles of laterals. Instead, however, of having works capable of watering nearly 45,000 acres, only about 4,500 acres could be covered, due to the uneven character of the ground. By the time these works were ready for use legal and financial difficulties had come on. Taxes were defaulted and resisted in the courts and while the earlier cases taken to the courts were won by the district or settled out of court, lower court decisions rendered in 1899 held the bond issue and all subsequent proceedings relating to them null and void. A similar outcome attended confirmation proceedings brought by the directors and other cases involving tax sales, and in 1902, after the district had been struggling along in spite of all difficulties and adverse decisions, and in some way getting a little water to the farmers, an unsuccessful attempt was made through *quo warranto* proceedings to stop any further corporate existence of the district, the case,[1] after going to the federal court on a question of constitutionality, finally being dismissed. Failure of the district to pay bond interest at last got the bonds into the federal court, where, on May 18, 1905, judgment was given conclusively establishing the district's obligation. After this judgment the futility of further opposition by the district was clearly apparent, and in the following year a compromise agreement with the bondholders was effected on a basis of 30 cents on the dollar for both principal and interest. The amount necessary to meet this compromise was $66,633.10, involving a levy of $21.60 per $100.00 on a total assessed valuation of $308,500.00. This assessment, although voluntary, was quite promptly paid by most of the landowners, and in June, 1915, the indebtedness had been met on the 30-cent basis so far as presented for payment.[2]

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[1] *Byington et al.* vs. *Sacramento Valley West Side Canal Company et al.*, 148 Pac. 790.

[2] Since the above was written appeal from this decision has been taken to the United States court.

During the decade and a half of litigation following the construction period in this district little if any attention was given to care and operation of the canal system, and about the only land irrigated was a little at the lower end. A few years ago the district entered into an agreement with a power company, now succeeded by the Pacific Gas and Electric Company, under which agreement in return for power privileges on the canal, the power company agreed to maintain the system to its original capacity without cost to the district. Thus freed from the burden of maintenance, and with the old indebtedness compromised, the district took a fresh start and after twenty years of trouble began to realize something of the original aims of its organizers.

TURLOCK AND MODESTO.

These two districts were the first to be organized under the Wright act. The conditions around Modesto which led up to the passage of the Wright act have already been referred to. Practically the same situation existed around Turlock, except that a greater proportion of the voting population in Modesto district than in Turlock district resided in the towns. For instance, of 700 who voted for the formation of Modesto district, 526 lived in the town of Modesto, while of the negative votes, only 25 out of 181 were cast by residents of Modesto. In Turlock district organization was carried by 291 to 72.

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[1] *People ex rel. Brady* vs. *Browns Valley Irrigation District et al.*, 119 Fed. 535.

[2] On June 9, 1915, all but about $1,700 of the voluntary levy had been collected and bonds and coupons amounting to about $6,500 were still unpresented for payment.

The essential condition in both of these two districts was the failure of dry grain farming to continue a profitable industry, except on a scale possible to the large landowners only, and to them it was only profitable on a greatly reduced scale. Those who could still be successful because of their large acreages were mostly opposed to any change, while those holding smaller farms and who felt the pinch of the decreasing profits were as a rule anxious for water. The town residents whose prosperity depended on the general prosperity of the community could clearly see the advantage of the more diversified and intensive farming that irrigation would bring.

Almost immediately after organization both Modesto and Turlock districts went promptly to work to formulate construction plans, and as soon as preliminary surveys had been made and reports based on them filed with the boards of directors, both districts proceeded to vote what they believed to be sufficient bonds to complete the systems proposed; and with these bonds voted, both districts undertook at once to make final surveys and let contracts. From the start, however, neither district was able to market many of its bonds outright for cash, and both sold them mostly through third parties.

It was originally expected that these two districts should obtain their water supplies from different streams. Tuolumne River was the only available source for Turlock district, but for Modesto district there was a choice between the Tuolumne and the Stanislaus, and the latter was first chosen. The advantage of both districts taking water from the Tuolumne was soon apparent, and accordingly they joined in the construction of La Grange dam, which was completed in December, 1893. Before this time the insufficiency of the original Turlock bond issue had become evident, and a second issue of the same size as the first had been voted. The original issue of Modesto district had been larger and its construction fund was not exhausted until the middle of 1895; but in July of that year a second issue was voted there, also.

While both Modesto and Turlock districts had been organized by ample margins over the necessary two-thirds of those voting, the minorities against organization did not cease in their opposition. This opposition mostly paid the first district tax under protest, but their next step was to refuse to pay and to seek injunctions against the enforcement of collections through the tax sales provided for in the law. In both districts suits were early carried to the supreme court but both were declared by that court to have been legally organized.

In the case of Turlock district a friendly suit was brought to test the validity of the Wright act, this being a proceeding to compel the secretary of the district to sign the district bonds. In its decision given May 31, 1888,[1] the court held that the Wright act was constitutional, that irrigation districts formed under that act were *quasi* public corporations in the sense that the purposes for which they were organized were for the general public benefit, and that it was not necessary for their validity that the methods adopted for the levying and collection of assessments should follow exactly the mode provided in the constitution for the assessment and collection of taxes for general state purposes. The case involving Modesto district was a petition filed in 1889 to have the proceedings for the issue and sale of the district bonds confirmed.[2] The lower court had confirmed the organization of the district, and with certain exceptions its judgment was confirmed. Among other things, the case involved the notice of the confirmation proceedings, the matter of including the town of Modesto in the district, the exclusion of 18,000 acres from the district after the organization and after the decision of the board of directors to sell $800,000.00 in bonds, and the resolution of the directors to sell $400,000.00 of the bonds after changing the source of supply. Not satisfied with this decision, the opposition appealed to the United States supreme court, by which the case was finally dismissed November 16, 1896. In spite of these two supreme court decisions upholding the districts and the validity of the Wright act, many decisions enjoining the sale of land for delinquent district taxes were given in the superior court, although the first of these were generally favorable to the district. Some of those who sought relief from district taxes were normally friends of the districts, but in such straitened financial circumstances, owing to the depression of the early nineties, that they were ready to take advantage of every opportunity to escape financial obligation. Every year in Turlock district from 1895 to 1900 blanket or individual suits against tax sales were brought and temporary injunctions obtained, but no attempts were made to bring the suits to final issue. In November, 1901, however, an issue was finally joined between Turlock district and those fighting it in the case of *Baldwin et al.* vs. *The Board of Directors of Turlock Irrigation District et al.* This case originally involved merely a contest between the taxpayers and the district, but later almost the entire number of Turlock district bondholders intervened to defeat the injunction prayed for. The decision of the superior court held not only that there had been no material irregularity in the issuance of the bonds, but also that those in possession of them were

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[1] *Turlock Irrigation District* vs. *Williams*, 76 Cal. 360.

[2] *Board of Directors of Modesto Irrigation District* vs. *Tregea*, 88 Cal. 334.

bona fide holders thereof and that hence the bonds were valid obligations of the district, even if there had been irregularity in issuing them. This was the last suit of importance in which the legality of Turlock district and its obligations were involved and from the time of the decision the people of the district faced forward rather than backward.

During most of the time that Turlock district was involved in litigation it had sought to continue construction and when the decision in the Baldwin case came, except for two of the main laterals, the heavy work of construction was already completed, and some water was ready for delivery to the district. This result had not, however, been accomplished without great effort, and without the failure of several contractors and very great difficulty in financing the work under way. In Modesto district there was less work to do and there had, perhaps, been more rapid progress in the earlier years of construction. By July, 1895, the headworks, the flumes in the upper nine thousand feet, and all earth work down to the district near Waterford, a distance of approximately twenty miles, had been completed. As in Turlock district, tax sales had been enjoined by the lower courts, but those in favor of the enterprise were able to keep control and to continue work until the spring of 1896, when the opposition elected two members of the board of directors pledged to use all possible effort to block progress. Shortly thereafter two of the old members of the board who had thus far supported the district resigned and two new directors were appointed who were with the opposition. Under the rule of the ''antis'' all work on the system was suspended for four years and no assessments levied to pay interest on outstanding bonds. A defense association was incorporated to strengthen the opposition, but times had improved and gradually sentiment changed, and in 1901 a new board was elected with at least three members in favor of going ahead. By this time the constitutionality of the Wright act had been upheld in the United States supreme court[1] and the opinion was growing in the district that there was no escape from the outstanding obligations. The bonds of the district were then valued at about forty or fifty cents on the dollar and unredeemed interest coupons could be purchased for 30 per cent of their face value. During this gradual change in sentiment some of the bondholders had sued in the United States courts for the defaulted interest and in August, 1901, a deputy marshal appeared with a mandate from the circuit court commanding the district to levy an assessment to pay an interest judgment against the district. With the arrival of this mandate from the United States court, Modesto district found itself substantially in the same situation that confronted Turlock district after the decision in the Baldwin case, and it also set about making plans for reorganization. As a first step a popular subscription of about $1,500.00 was presented to the new board of directors for the purpose of making such surveys and studies as might be necessary to determine the cost of completing the irrigation system that had been started. In October, 1901, plans for going ahead were submitted and an assessment of $50,000.00—the first since 1896—was levied for the payment of outstanding interest.

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[1] *Fallbrook Irrigation District* vs. *Bradley*, 164 U. S. 112.

When the Wright act was revised in 1897 a supplemental act was also passed providing for the funding of irrigation district indebtedness, and in the new turn affairs had taken in Turlock and Modesto districts, it was clear both to the districts and to the bondholders that they should proceed under this law. Accordingly an agreement was drawn up between each district and its bondholders under which the old indebtedness should be retired and a new financial start made by each district. Including interest and principal on outstanding bonds and floating debts, the total indebtedness of each district now reached approximately $1,350,000.00. To meet its indebtedness Turlock district issued 5 per cent bonds in amount of $1,082,000.00, or at the rate of 80.5 cents on the dollar, and in Modesto district funding bonds were carried by vote of 433 to 24, sufficient to pay the original indebtedness as it stood in January, 1902, on a basis of dollar for dollar, less a refund to the district of five years' interest on the funding bonds.

From the funding of their indebtedness in 1902, all doubt as to the future success of Modesto and Turlock districts disappeared, and both districts set resolutely about getting water to the landowners. Having its principal work already completed when the compromise was effected with the bondholders, Turlock district was already delivering water, and within three years water had been carried to 20,000 acres. Modesto district, however, had first to complete its system. In March following the compromise plans for building the distributing system within the district and for repairing the upper works were adopted and by July contracts for all of this work had been let. Through the cooperation of the bondholders and public-spirited citizens within the district necessary funds were raised and on October 6, 1903, the work under the last contract was accepted. Before the season of 1904 was over, nearly 7,000 acres had been irrigated and a start had finally been made in changing Modesto district to the community of diversified farms contemplated when the author of the Wright act drafted that act fifteen years before.

POSO.

Among the California districts formed in a *bona fide* effort to build entirely new irrigation systems the three whose histories have just been given were the most conspicuous. Central district, as was pointed out, failed largely because decades ahead of its time, and because the larger holdings and the larger rainfall there made dry grain farming still profitable over a considerable portion of the district's area. Turlock and Modesto districts, on the other hand, succeeded in spite of obstacles because with their smaller rainfall and their smaller average holdings, the declining wheat market made the old-style dry farming no longer tolerable. For all three of these districts the water supply was ample and in each there was a sufficient farming population to be fairly representative of those to come. Poso district represented most strikingly a third type in this group, the type that failed because of physical rather than of human difficulties. Probably no district formed in a well-meant attempt to accomplish something was more ill-advised than it was.

With all of its 40,000 acres, Poso district mustered only twenty-six voters at the organization election, and with these twenty-six voters the wish for a water supply was entirely the father of the effort to obtain it. Even a half-million dollar bond issue was voted without any prior surveys or engineering estimates. Then engineers were employed and a ditch system laid out, and so hopeful were the people that they issued a glowing prospectus setting forth, among other things, that the district had "an undisputed, bountiful, invaluable water supply, perfectly practical project, planned for the procurement of the same; ample storage facilities, economical system for distribution, first-class drainage, rich, deep soil, and unexcelled climate." The county assessment roll, when the district was organized, gave the district lands a value of $502,000.00, but the district looked into the future and claimed a value, without improvements, "when the district works are completed," of eight times that amount.

The water supply for Poso district was to come from Poso Creek and the proposed works included a masonry dam 40 feet high, a 2.5-mile all-rock cut, 94 miles of canal, and two reservoirs, together holding "2,647 million gallons," "sufficient for ample irrigation of the district." After using $60,000.00 of the bonds for miscellaneous purposes the district agreed to turn over the remaining $440,000.00 to contractors for a completed system of works, to be finished within one year. Under this arrangement an inferior dam of some sort was constructed, also several miles of wooden flume, and a large canal was carried out some distance into or toward the district. No record has been found of the exact amount of the bonds that were actually disposed of, but it is presumed that most of them were, when finally it dawned upon the people who, without any experience either in irrigation or in large financial affairs, had rushed into the enterprise with a blind enthusiasm, that the water supply in Poso Creek was wholly inadequate for their needs and totally undependable. When, in the midst of their disappointment over the failure of the water supply, an unexpected freshet carried out their dam, the enterprise utterly collapsed.

Few of the old irrigation districts were involved in more litigation than was Poso district. The organization of the district and the bond issue had been confirmed shortly after the bonds were voted. Several of the cases that went to the higher courts resulted in interpretations of the Wright act that had not yet been made. One of the decisions in these cases held that confirmation proceedings would estop an attack on the legality of an organization and of a bond issue confirmed, or in other words, that judgment in confirmation proceedings is binding on all the world until reversed on appeal or set aside by some direct proceeding instituted for that purpose.[1] In another of these cases it was held that public lands, of which the district was in considerable part made up, could not be included in an irrigation district, that neither the state nor its agencies could impose assessments thereon, and that the sale or patent thereof after issuance of bonds could not operate to charge the land with any pre-existing liability not assented to by the government or its grantee.[2] In a federal court case brought to *mandamus* the supervisors of Kern County to levy an assessment to cover an interest judgment, the *mandamus* was allowed and later confirmed.[3]

In spite of the failure of the irrigation works undertaken by Poso district and the abandonment of the district enterprise the lands included in the old district have gradually increased in value and the owners of these lands have long realized that some kind of a settlement must some day be made with the bondholders. This settlement is now in course of consummation, an investment company which has acquired most of the old bonds having offered in connection with a title insurance company to insure lands in the district against liability on account of the old bonds on payment of $11.00 per acre, or a little less than the original bonded indebtedness exclusive of interest. While only a few hundred acres included within the old district are now being watered, up to November, 1914, settlements had been effected on the above basis covering 16,715 acres.

ESCONDIDO AND OTAY.

The Wright act, as has already been indicated, was an outgrowth of conditions in Sacramento and San Joaquin valleys under which the larger riparian owners and the larger landowners were holding back irrigation development. Almost as soon as the act was passed, however, other communities recognized in it a means of irrigation organization of wide application. As the succeeding pages of this historical sketch will show, the southern counties of the state most largely undertook to utilize the act, thirty of the forty-nine districts organized having been in counties south of Tehachapi. Of these thirty southern districts six were formed in what now constitutes San Diego County, and of these six, Escondido and Otay, among those that seem to have had at least some justification, are of most interest.

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[1] *Crall* vs. *Board of Directors of Poso Irrigation District*, 87 Cal. 140.

[2] *Nevada National Bank of San Francisco* vs. *Poso Irrigation District*, 140 Cal. 344.

[3] *Nevada National Bank of San Francisco* vs. *Board of Supervisors of Kern County et al.*, 91 Pac. 122.

Both Escondido and Otay districts, although considerably larger than they should have been, began with sufficient available water to justify irrigation development. Both were mainly started by the smaller landowners and openly or tacitly opposed by the larger ones. In Escondido, which contained the larger population, energetic effort carried the enterprise all but to success, in the face of the bitterest and most vicious opposition. In Otay, on the other hand, discouragement came when the estimated costs were made public, and constructive activity soon ceased.[1]

Escondido irrigation district was in the first instance undertaken with but little open opposition, only fifteen votes having been cast against organization. About one-half of the land, however, was still owned by Escondido Land and Town Company, from which most of the residents of the district had previously purchased. With only "fifty or a majority of the holders of title, or evidence of title," to the lands to be included necessary to initiate a district, it was possible to get started without the acquiescence of the Land and Town Company, and the laying out of an irrigation plan and the issuance of bonds to carry it through, and also the construction of sufficient part of the system to irrigate about 1,000 acres, seem to have been accomplished without great difficulty. But the smoldering opposition grew along with a realization that the system planned was insufficient to water all of the irrigable lands of the district. The first real trouble came when interest on the bonds was due, the Land and Town Company refusing to pay its district assessments, amounting to about $11,000.00 per year, and others following its example. Every effort was made by the opposition to dishearten the people and by discouraging prospective land buyers, to reduce the ability of the smaller landowners to meet their district taxes and thus increase the growing spirit of repudiation. Bond issues aggregating $350,000.00 had been voted and sold through the contractor at 90 and 91 and about $320,000.00 had been expended for construction and water rights.[2] With this money spent and interest constantly accruing, and with the larger landowners refusing to pay district taxes, the failure of the enterprise was inevitable. While a few of the landowners paid their taxes in full even up to the time of disorganization, most of them ceased paying after the second and third years. In order to secure its two bond issues the district executed trust deeds conveying the whole water system to a trustee and in default of interest the trustee had taken over the system and was operating it on water tolls, although he was estopped from foreclosure and sale of the system by supreme court decision holding the trust deeds invalid.[1] After a long period of depression, during eight years of which it is said not a house was built in Escondido, an agreement was secured with the principal bondholders by which, for a consideration of $200,000.00, with interest from the date of the agreement, the old debt then, counting interest, amounting to something over $500,000.00, was to be canceled. Of this $200,000.00 consideration $50,000.00 was to be used to repair parts of the system so that by getting water certain of the landowners who had previously held out would be ready to join in the proposed settlement. To carry out the settlement the Escondido Mutual Water Company was organized, each landowner taking stock at one dollar per share in proportion to his individual quota of district indebtedness. With this accomplished the district was disorganized, and in the midst of great rejoicing the bonds were burned September 9, 1905.[2]

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[1] The area included in Otay district was 44,000 acres, mostly of the rolling character so largely used in citrus culture. When the district was formed it was thought that $5 per acre would provide a water supply, Moreno reservoir being planned as the source. The engineer's estimate for the cost was $1,200,000, or about $27 per acre. The engineer's report expressed confidence that the sum suggested would "provide for the district so abundantly as to bring to it a degree of prosperity" that would permit it "to afford any further refinement in distribution or amplification of capacity or supply that may be found necessary or desirable."

[2] The actual price said to have been paid by the real bond-buyer to the contractor was 75.

The human situation in Otay district was wholly different from that in Escondido. Opposition at Otay was active from the beginning and is said to have been led by a defeated candidate for the first board of directors and by owners of hillside vineyards who did not want irrigation, as well as by a number of vegetable growers. The district got into trouble at once through mismanagement. A bond election that had been proposed was stopped when the estimate of the engineer who had been employed indicated that the cost of works would be much larger than anticipated. Shortly thereafter the directors undertook, without a special election, to levy an assessment of $9,000.00 to pay outstanding debts and continue the organization for another year, but on appeal to the courts the assessment was held invalid.[3] In the meantime a portion of the assessment had been collected but the district collector refused to turn the amount collected over to the treasurer, resulting in a suit against the collector for embezzlement of funds, and in another supreme court decision.[1] A third supreme court case involving Otay district was that of *Decker* vs. *Perry*,[2] but no important questions were involved. In spite of the litigation the district directors continued to meet and before a majority had been elected, pledged "with God's help," to wind up the affairs of the district; they had voted themselves mileage and salaries amounting to over $2,500.00 and had contracted debts considerably exceeding that amount. On November 14, 1894, a vote was carried to petition the superior court for dissolution, but this was prevented by the unpaid creditors, for, although their claims had outlawed, and were no longer good in law, the court held that they still constituted claims in equity which would estop disorganization. With the exception of brief activity in 1910, when a new board of directors was appointed by the supervisors of San Diego County, and the land later included in San Ysidro district was petitioned out, Otay district has had no activity since then, and the district is still a legal entity.

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[1] *Merchants National Bank of San Diego* vs. *Escondido Irrigation District*, 144 Cal. 329.

[2] One of those most active in supporting the district and finally in re-organizing it on the basis of a mutual water company recently stated that there was absolutely no excuse for the district not succeeding. The same water supply is now used and the dam in Von Sergern Canyon above Escondido is no higher than it was when the district was organized. While the mutual water company has made some improvements in the system, there is but little more land irrigated now than before the district disorganized. It is clear, however, that the mutual water company plan, under which the cost of irrigation is borne by those using the water, is fairer to all concerned than the old district embracing such a large area for which no water was available.

[3] *Woodruff et al.* vs. *Perry et al.*, 103 Cal. 611.

Nonspeculative Districts Formed Wholly or Largely for Reorganization or Improvement of Existing Systems.

Of the eleven districts placed in this group, a number went through experiences of considerable interest. Happy Valley district was unimportant and was soon abandoned, a small cooperative company taking over the private system the district was formed to take over. Santa Gertrudes district was mainly formed as a means of financing the construction of a pipe line to replace a leaky flume. No one volunteered to take the $55,000.00 in bonds they voted, and while the district was waiting for something to turn up, it lost through nonuse the water right it started with. Selma, Vineland, Glendora and Strong are covered in the footnote.[3] Of the remaining five in this group, Alta, Tulare, and Walnut are now active and their histories are therefore of some present importance. Madera and Anaheim districts both failed early, but because a new district is now proposed for Madera, and because Anaheim was one of the most worthy of the efforts under the Wright act that did not succeed, and also because the old Anaheim district was thoroughly typical of an important stage of general irrigation development in California, these two districts, along with the three that are still active, warrant fairly full consideration.

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[1] *Perry* vs. *Otay Irrigation District et al.*, 127 Cal. 565.

[2] 101 Cal. unreported cases.

[3] *Selma.*—For some time prior to the formation of this district there had been water-right troubles along lower Kings River, chiefly involving claims of lower riparian owners. As a result the farmers under Fowler Switch and Centerville and Kingsburg canals found themselves threatened with water shortage. To better their situation they organized under the Wright act, including about 200,000 acres in their district, and from reading such records of the old district as are available it would seem to have been their intention to overcome the riparian owners almost regardless of how they should do so. Apparently, also, the farmer stockholders in Fowler Switch and Centerville and Kingsburg canals were quite willing to exchange their shares for district bonds, and at a sufficiently high price to arouse some local criticism. Real activity in the district, however, did not last long, for attempts to vote large bond issues failed twice in 1890 and again in 1891. Still those holding to the district idea continued the organization and succeeded in carrying assessments for a number of years, but apparently without accomplishing anything and with no clear purpose in view. Ultimately Fowler Switch and Centerville and Kingsburg canals passed into individual ownership under which they were operated on a water-right basis, and later passed into control of the Consolidated Canal Company, which united in one control the appropriation and riparian interests that had been in controversy. As early as 1891 an attempt had been made through *quo warranto* proceedings to have the district disorganized, both because it had failed to use the privileges and rights for which organized and because, in spite of the repeated decisions of the voters not to issue bonds, the salaries of officers were still being paid by means of assessments. The interesting phase of this attempt was the decision, affirmed by the supreme court (*People* vs. *Selma Irrigation District*, 98 Cal. 206) that the Wright

MADERA.

The history of this district has added interest because of the likelihood that, although the old district failed and was disorganized, the district form of organization is finally to prevail in the Madera community.

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act made no provision for judicially dissolving a district and that the court was without power to act. This decision led to the act of 1903 providing for such dissolution. (Statutes 1903, chapter V. *See, also*, amendments Statutes 1908, chapter 91; Statutes 1911, extra session, chapter 26, and Statutes 1913, chapter 39.)

Vineland.—This was a small district, the first of twelve organized in Los Angeles County, and is interesting both because of its present problematical status and because it indicates something of the handicap involved in uncertainty over water rights and in the lack of state regulation of water appropriations. The community that organized the district had been using some water from San Gabriel River, but increased diversions above, at Covina, Azusa, and Duarte, had reduced their supply. Bond issues amounting to $52,000 were utilized in purchasing water rights, in boring a 3,000-foot tunnel under the San Gabriel, and in constructing a cement-lined and pipe distributing system, both legal and engineering advice having guided the district in all they undertook. The tunnel under the San Gabriel, however, was so located as to withdraw water that otherwise would have passed on to the upper communities and on suit by them, affirmed by the supreme court (*Vineland Irrigation District* vs. *Azusa Irrigating Co.*, 126 Cal. 486) they were held to have rights superior to the district. Fortunately, prior to this decision the district had entered into agreement with a power company under which, in return for the district ceding to that company whatever rights it might have in San Gabriel River, the power company was to install a pumping plant in the district and furnish power for its operation. Under this agreement a well was developed giving about 100 inches of water (two cubic feet per second) so that the district got something for its effort and for the bondbuyers' money it spent. Since 1894, however, the district has defaulted in interest payments and so far as can be learned has done nothing in satisfaction of the bonds, which came due in 1910. The pumping plant (which has since been changed to a steam plant operated by the district) was managed under the district organization for a number of years, but being somewhat unsatisfactory, and irrigation districts by that time having come into rather bad repute, the board of directors resigned and no one voted at an election called to select successors. The former secretary has continued in possession of the records and on advice of attorneys the treasurer has continued to hold a balance of about $1,500 collected by assessment before the district was abandoned. From time to time interest coupons have been presented for payment, but this has been refused by the treasurer, he holding, on advice, that he could not make payment without giving preference to some of the claimants, and that he was authorized to pay out the money only on warrant from the district. Other than the case above referred to the district has not been involved in important litigation. Several suits were brought to annul tax sales by the district and to declare the bonds void. In two of these cases (136 Cal. 185, 140 Cal. 376) bondholders intervened. In the former case it was found that the bonds of the district were legally issued and that the tax sales in question were valid; in the latter case the action was dismissed. One suit was brought in 1903 to compel payment of bond coupons amounting to $1,356, but this was dropped on stipulation to resume after ten days' notice. It is said that about 2,000 acres is now being irrigated in the district, of which about 1,500 acres receives water from the well owned by the district. The water is handled by a local unincorporated co-operative company.

Glendora.—This district was formed, almost unanimously, to take over the Glendora Water Company, its organizers having mainly been landowners who had expected to obtain water from Glendora Water Company, but which that company seemed unable to provide. Agreement for the purchase of the Glendora system was entered into before the district was formed and it was intended also to develop water from tunnels back of Claremont. Misunderstanding in interpreting the agreement with the Glendora company resulted in that company actively opposing confirmation

Madera district was formed, and later voted an $850,000.00 bond issue, almost unanimously.[1] Opposition developed, however, as soon as confirmation proceedings were started. The superior court confirmed both the organization and the bond issue, but an appeal was taken by the larger landowners and the case sent back to the lower court for a new trial.[2] The attack on the organization concerned the validity of the organization petition and, in addition, the constitutionality of the Wright act was again attacked. Although deciding against the district in the matter of confirmation, the supreme court quite exhaustively reviewed and affirmed its previous decisions upholding the act.[3] Before this litigation was started the district had agreed on a plan of works estimated to cost $470,000.00, and steps had been taken to acquire the beds of Summit, Highland, Kellogg, and Shadow lakes, which it was proposed to use for reservoirs. With a view to purchasing the system of the Madera Canal and Irrigation Company the district had caused a valuation of the property of that company to be made, and proposed to purchase it for $100,000.00 in district bonds at par, but a definite offer either was never made, or was not accepted. While the successive boards of directors continued their efforts in behalf of the district,

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of the district and of its $170,000 bond issue. The lower court confirmed the district and the bonds but after appeal to and subsequent rehearing by the supreme court the lower court was reversed (*Cullen et al.* vs. *Glendora Water Company*, 113 Cal. 503) "for the reason that the board of directors of the Glendora irrigation district made no estimate of the amount necessary for any purpose" before calling the bond election. Among other points decided was one that where the supervisors had ordered the election of directors at large it was not necessary to provide more than one precinct in the election. Even before the decision in this case in 1896, the district plans had been practically abandoned and a mutual water company organized. The entire area within the old district boundaries is now irrigated by the mutual company.

Strong.—This district was unique in that it was organized to safeguard a water supply already available rather than to acquire a new one or to construct irrigation works. The lands embraced were part of the ranchito, near Whittier, formerly owned by Pio Pico and, since about 1855, served with water from San Gabriel River through Rincon ditch. Beginning about 1882, however, the owner of Puente Rancho on which Rincon ditch headed and through which it passed, had challenged the right of the lower users to the ownership of the ditch and for a number of years had exacted rental. Being dissatisfied with this arrangement and not having the right of condemnation as private users, the irrigators under Rincon ditch formed Strong irrigation district in the spring of 1893 and in the following year began proceedings for a decree of condemnation. That particular suit was not pressed, but another one was brought by individual landowners in an effort both to establish a prescriptive right to the use of the ditch and a right to the water carried. The lower court decided favorably for the landowners (*Strong et al.* vs. *Baldwin*, 137 Cal. 432), but its decision was reversed. In the second trial, however, the landowners were upheld both in the lower court and on appeal (154 Cal. 150). Activity by the district ceased in 1898 while the litigation was still pending, but the community has continued to operate Rincon ditch by means of a mutual water company, although as the full acreage of the district was irrigated when the district was formed, there has been no increase. One of the reasons given for letting the district organization lapse was dissatisfaction on the part of some of the users over the levying of uniform assessments throughout the district, as provided for in the Wright act. Users near the head of the ditch felt that they should not be obliged to pay as much for maintenance as those further down. Under the mutual plan of operation the ditch was divided into three sections and the charge made smaller at the upper end and larger at the lower end than in the central section.

[1] The vote on organization was 292 for and 5 against; that on the bond issue, 243 for and 7 against.

[2] *In re Bonds of Madera Irrigation District*, 92 Cal. 296.

[3] See *Turlock Irrigation District* vs. *Williams*, 76 Cal. 360, and *Central Irrigation District* vs. *De Lappe et al.*, 79 Cal. 351.

levying assessments for preliminary expenses in 1889, 1890, and 1891, continued opposition of the larger landowners and resulting litigation finally discouraged the people, and after a failure to compromise in 1891, propositions to disorganize and to levy an assessment of 16 cents on each $100.00 for clearing off all indebtedness were overwhelmingly carried, and the district dissolved April 18, 1896.

It seems very evident that Madera irrigation district failed because of an effort to accomplish too much, seeking an ideal rather than the best practicable system. When the district was formed Madera Canal and Irrigation Company was irrigating an area since estimated at from 5,000 to 12,000 acres, and 5,000 acres more or less was receiving water from White House Canal, the remaining area in the district being entirely in grain or pasture. Yet, without the cooperation of the larger landowners, and without reaching any agreement with those holding riparian rights on Fresno and San Joaquin rivers, the people of the town of Madera and those holding tracts of 20 to 320 acres surrounding it sought to finance and organize an irrigation system larger than any that had ever been constructed in the state. Had the people within reach of Madera Canal been able to concentrate on the purchase and improvement of that canal, their condition would have been very much better than it is at present. As in the case of other communities which attempted to operate under the Wright act, however, the community overestimated their power over the opposing and more strongly intrenched minority. The failure of the earlier enterprise has probably decreased the supply from Fresno River to which the Madera community can maintain a claim, yet that failure should render it easier for the present community to agree upon and to carry through a more feasible plan. During the past few years the question of forming another irrigation district has again come up and it is again proposed both to acquire the system of the Madera Canal and Irrigation Company and to obtain water from San Joaquin River, partly by storage above Pollasky. While it is planned in a general way to cover about 150,000 acres, the proposition to organize has not yet been sufficiently worked out to enable the community to know just what is feasible, nor have water-right questions on Fresno and San Joaquin rivers been sufficiently cleared up to indicate what is possible to the proposed new district in the way of an undisputed water supply.[1]

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[1] Since the above was first printed, Webster irrigation district, comprising 15,000 acres lying generally within the proposed new Madera district, has been formed. This is a pumping project from wells near San Joaquin River, and has no connection with the proposed larger project.

ALTA.

One of the most interesting things about this district is that it succeeded, although with the usual financial difficulties before getting securely on its feet, and only after a compromise with the bondholders and a financial reorganization in 1902.

Alta district appears to have been promoted by the '76 Land and Water Company, which had built the '76 Canal, and was already furnishing water to about 19,000 acres, selling water rights at the rate of $200.00 for each 40-acre tract. Including the reimbursement to the holders of water rights under the canal for the amounts paid by them for water rights, the district exchanged $410,000.00 in bonds for the '76 system and utilized additional bonds to the amount of $133,000.00 in improving the old canal and in building laterals. Not being able to dispose of their bonds for cash, and being advised by their attorneys that they could not exchange them for work, the district made informal agreements with contractors to purchase the branch canals after completion by them, the work to be done in a manner satisfactory to the district. During the dark days of the district in the nineties, however, when taxes were being contested, this novel irregularity in the disposal of bonds was the ground for a superior court decision August 12, 1898, that the bonds were void because no plan or estimate of the cost of the system of irrigation works was made by the directors before calling a bond election, and because the act of the district in surveying ditches and then having an understanding with certain contractors that after approval by the district those ditches would be purchased by it at so much per cubic yard amounted to no more than the employment of the contractors to do the work and was therefore illegal.[1] This decision, which was given in one of the suits brought by outside attorneys in their general campaign against the Wright act, did not, however, serve to invalidate the bonds, but merely added to the unsettled condition which was not finally cleared up until the district and the bondholders agreed to a refunding of the original bonds, of which $543,000.00 were outstanding, at a discount of 25 per cent. At the time of this refunding landowners in the district signed an agreement not to contest the new issue and that issue was confirmed by the superior court July 3, 1902. While the district failed to levy assessments for the payment of interest in 1898, 1899, and 1900, the interest defaulted in those years was paid with a discount of 25 per cent at the time of the compromise. Since the compromise and refunding Alta district has been steadily going forward and, as shown later in this report, is now in a much improved condition.[1]

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[1] This case was not appealed and no supreme court decision has been found covering this point.

TULARE.

The agitation that led to the formation of Tulare irrigation district goes back to the days preceding the passing of the Wright act in 1887. Several ditches had been taken out and were intermittently serving the territory about Tulare, but the people under them had not fared well and they made up their minds they could best improve their situation and circumscribe lower riparian proprietors through some community effort. For that reason they joined in bringing about the passage of the Wright act and the matter of organization was taken up shortly thereafter. At first it was planned to include all of the land south of Kaweah River between the foothills and Tulare Lake that was irrigable from that river, in all about 210,000 acres. This conception, however, soon proved too large, and after one landowner after another got himself eliminated the area of the district was finally cut down to 39,360 acres.

When Tulare district was organized not to exceed 3,500 acres, it is said, was being watered from Kaweah and Rocky Ford canals. Bonds to the amount of $500,000.00 were voted and $250,000.00 of these were used in the purchase of Settlers and Kaweah canals. After building a portion of the main canal from the proceeds of the $50,000.00 in bonds sold for cash, the district contracted for the construction of laterals and the enlargement and completion of the main canal, paying for the work indirectly in bonds. Thus, the district was able to get started in the delivery of water. All of this time, however, more and more friction was being developed and with the panic of 1893, when it was hard for farmers to get prices for anything, a number of attorneys employed by some of the larger landowners and by landowners in other districts with a view to breaking down all operation under the Wright act, began to arouse a feeling that the district had been illegally managed and that the bonds need never be paid. The district had originally organized by a vote of 484 to 7, and assessments had been regularly levied from 1890 to 1894 and paid without contest. In 1895, however, few paid district taxes, for "being hard pushed by the panic the consciences of the people were made a little easy." Returns from the crops being grown, it has been stated, would scarcely pay the interest on the bonds, saying nothing of other taxes and living expenses.

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[1] No case involving Alta irrigation district is known to have been carried to the supreme court except one involving damages decided against the district in 1910 (*McPherson* vs. *Alta Irrigation District et al.*, 112 Pac. 193). In suits brought in the superior courts of both Tulare and Fresno counties property of the district necessary to the objects of the district was held not to be taxable by the counties. Many of the suits involving Alta irrigation district had to do with water rights on Kings River.

While the sentiment for default was growing in Tulare district many of the substantial people held strongly together for keeping faith with the bondholders. As one has stated, "they had obtained the money in good faith, and had blown it in good faith, and were swamped in good faith, and should settle in good faith to the best of their ability." People holding that view, however, were in a minority and during the agitation and the panic property values within the district fell to almost nothing. For five years, it has been stated, "nobody nailed a board on a fence or planted a tree or a vine." In many instances crops were not planted, houses went into a state of dilapidation, and one bank and several mercantile establishments went out of business. While that state of affairs continued some water was kept running in the ditches, but the district itself practically ceased operating. At last it was realized that the only thing that could be done was to call the creditors together and offer to pay them as much as they could. After looking carefully into the situation those who were endeavoring to arrange a settlement decided that 50 cents on the dollar, not allowing anything for accrued interest, was about all the people could afford to pay.[1] This basis of settlement was accepted by the bondholders and $273,075.00 was raised in order to carry it out, some of the opposition holding out to the last hour during which opportunity for such a settlement was to remain open. On October 17, 1903, Tulare district bonds were burned and from that day the district has had no bonded indebtedness; for, unwilling after their long period of trouble, to be subject to further assessments, it was decided to operate the system on a purely tolls basis. With the exception of one assessment for betterments, the district has entirely maintained itself and operated its works out of water tolls since the compromise.

From the date of the compromise values in Tulare district immediately began to return to their former figure. District officers were again elected and the organization once more became active, and although now operating largely only as a cooperative company, as indicated later, has been active ever since.[2]

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[1] The present prosperity of farmers in Tulare district prompted a banker of Tulare recently to say that it is no credit to the people of the district that they settled at fifty cents on the dollar, for if they had postponed settlement a little longer they would have been able to pay the indebtedness in full. Looking at the situation as it was in the panic years of the nineties, however, he considers that they accomplished a task that was very much to their credit.

[2] Tulare irrigation district had more than its full share of litigation, some forty cases being on file in the superior court of Tulare County up to 1910. The organization of the district and the bonds were confirmed as early as April 2, 1890, Notwithstanding this, the superior court of Tulare County, in numerous suits seeking to have the bonds declared invalid and lands released from paying assessments, decided that the district had been illegally formed and that the bonds were invalid. No record has been found of decisions of the supreme court of the State on the legality of the district, but in the case of *Shepard* vs. *Tulare Irrigation District*, first carried to the federal courts in California (94 Fed. 1) and finally to the United

WALNUT.

Although not fully representative of the early irrigation district movement—it contains only 869¾ acres and has never taken advantage of the bonding provisions of the district law—Walnut irrigation district has the unique distinction of never having had financial trouble and of having been uninterruptedly successful from the beginning.

The district is located near Rivera, southwest of Whittier. For a number of years prior to organizing the community embraced had been receiving water somewhat irregularly from San Gabriel River through Standifer or Ranchito Ditch, but without rights to other than surplus water, and without adequate means for distributing what water they did get. Standifer Ditch was then unlined and losses from it were heavy, and it occurred to the small community near Rivera that if they could save the losses in that ditch above their lands and also in distributing water among themselves their supply would be satisfactory. They found that by organizing as an irrigation district they could condemn a right of way through Standifer Ditch and that they would also then have a convenient means of operating their irrigation system. Shortly after organization they brought a condemnation suit, probably friendly, against Standifer Water Ditch Association, also asking for the right to enlarge Standifer Ditch. In May, 1895, a settlement was agreed upon and entered as a court decree, awarding Walnut district the right to enlarge and use Standifer Ditch, provided that the district should build a wooden flume or otherwise improve the ditch and maintain it to a certain point in return for the double privilege of using the surplus water carried and of carrying the additional water the district should divert in accordance with a 200-inch filing from the San Gabriel made shortly after organization. The provisions of this decree were complied with by the district, the wooden flume extending from the Santa Fe track to the Pico or Whittier road, and costing approximately $6,000.00. Later this flume was taken out and the ditch cemented at a reported cost of about $8,000.00, which included the cost of a short section of cement pipe. The district also purchased a two-fifths interest in 17 acres of water-bearing land at the head of Standifer Ditch.

Walnut irrigation district was organized with practically unanimous consent and has definitely improved the conditions that existed prior to organization. Instead of issuing bonds, all funds have been raised by assessment or water tolls. While assessments during the reconstruction of the system were a little heavy, the operating expenses have been

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States supreme court (185 U. S. 1), decided March 24, 1902, just a short time prior to the final settlement, it was held that *bona fide* purchasers of bonds occupied an unassailable position without regard either to the original judgment of confirmation or the later judgments declaring the districts invalid. In this case the district and the individual defendants relied only on the claim that there had been some defect in the printing of the original notice of the petition to the supervisors for organization.

exceptionally small and have been provided for by a charge of ten cents per hour per irrigating head used, the heads normally being about 200 inches. According to the agreement with the Standifer Ditch Company, the district pays all of the cost of maintaining from two to three miles of the ditch between the intake and the district line, and two-fifths of the remaining cost above the district. When assessments have been levied they have been voted practically unanimously and paid without delinquencies. The entire area in the district is irrigated.

In addition to the original condemnation suit, Walnut district has been involved in two suits that were taken to the supreme court, one of which,[1] was of importance. This suit had to do with the right of a landowner within the district to use outside of the district boundaries part of the water to which land owned by him within the district was entitled. The court held that under section 18 of the Wright act a landowner in an irrigation district had no right to water for use outside of the district, saying that ''The right of a landowner of the district to the use of the water acquired by the district is a right to be exercised in consonance with and in furtherance of such ultimate purpose, viz., for the improvement by irrigation of lands within the district and in no other way.''

Walnut irrigation district has been operated by a board of directors elected at large, although in practice selected to represent different divisions of the district. The district is chiefly devoted to walnut and citrus groves and is all irrigated. The present status of this district is described later.

ANAHEIM.

Anaheim irrigation district seems to have grown out of a rather general desire among the irrigators supplied by Anaheim Union Water Company to improve the water service of that company and to force the holders of the larger unirrigated tracts of the neighborhood to share the expense of the water development that was rapidly adding value to their lands. The district seems largely to have failed as a district because of being conceived on a too extensive scale, and because opposition that existed from the start was greater than it was possible to overcome. It strikingly illustrates, however, the great power of a minority to prevent the success of an irrigation district if determined to do so.

The history of Anaheim irrigation district is really the history of the critical period in the irrigation development of what is now one of the important agricultural communities of the state. Fortunately, that history, which is quite typical of the worthier but yet unsuccessful district organizations under the original Wright act, can be given largely in the words of one of the organizers and later presidents of the district, Mr. F. A. Korn, who, under date of September 15, 1900, when past 73 years of age, carefully penned an account of "irrigating thirty-three years in Orange County" in response to a request for information about the old district.

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[1] *Jenison* vs. *Redfield et al.*. 149 Cal. 500.

Omitting such portions of Mr. Korn's letter as can be omitted without breaking the story, he wrote as follows:

The undersigned bought in March, 1867, in the old colony of Anaheim. Anaheim irrigated at that time about 1,100 acres, mostly in grapes; water came from the Santa Ana River about three miles east of Anaheim. The water right was bought from the Yorba's (an old Spanish settlement) in 1857.

Shortly after I came to Anaheim the Stearns rancho was surveyed and put on the market. The first settlers arrived in 1869. It did not take long before they found out they could not raise a crop every year except they had water to irrigate with. A few settlers close to Anaheim applied for water to the Anaheim Water Company and it was sold to them for $3.00 per acre for one share of stock in the Anaheim Water Company. The other settlers on the northern side of Anaheim had to make their own ditches; it took several years before an irrigation ditch was made to the river. Even then it did not amount to much. It would not carry water in the summer months.

The legislature in 1872 (I believe) passed the so-called Bush act and under this act a number of farmers of Placentia had an irrigation ditch surveyed to Bedrock Canyon. They worked until their means were exhausted; it was about one-tenth part finished.

In 1875 or 1876 a gentleman bought a large tract west of Yorba and formed a company of all his neighbors and all those who had an interest in the unfinished ditch; this company was named the Cajon Canal Company. When in 1879 the Cajon Canal was finished, land which could be irrigated just doubled in value. In January, 1884, the Anaheim Water Company and the Cajon Canal Company consolidated and incorporated under the name of Anaheim Union Water Company with a capital of $1,200,000.00, divided into 12,000 shares, only 7,000 shares to be issued at present. The landowners had expected another rise in land values after a consolidation of the two water companies, but in this they were disappointed; a speculator would not improve his holdings knowing well enough they would bring big interest sooner or later. Time went along without much improvement, the Santa Fe railroad was built, the town of Fullerton came into existence, and the boom of this part of the country was felt all over. The Wright irrigation law had passed the legislature and several districts under this law had been formed in the northern part of the state. Many shareholders in the water company were dissatisfied, believing that under the Wright act irrigation water could be got cheaper than the Anaheim Union Water Company sold it although the company never charged more than the cost of running expenses. Many meetings were held, resulting in a petition to the board of supervisors to grant us the right to form an irrigation district. It took about one year before the board of supervisors granted the right to form the Anaheim irrigation district; the land company and a few large landowners were against it. The first board of directors were elected and every farmer in the district believed the bonds would be sold before the end of the year, but they did not succeed.

When the next election was held I was elected director for the Anaheim district and was re-elected until the district was dissolved by the court. The board of directors under which I served did their best to sell bonds, but we never had an offer to sell our bonds for 90 cents on the dollar and for less than 90 cents we would not sell. A number of promoters and schemes made all kinds of propositions but we wanted to see cash to build reservoirs with.

Nearly four years had passed with us not being able to sell any bonds and $36,000.00 had so far uselessly been expended. The taxpayers began to think they had expended money enough to form an irrigation district. An election was held to dissolve the district which was almost unanimously carried. All our debts were paid, and the superior court dissolved the district.

Other data than are included in the above letter indicate that the controversy over the organization of Anaheim district was at times heated, and that some of the ablest lawyers of southern California were arrayed on the opposing sides. It had been proposed to purchase the system of the Anaheim Union Water Company for $300,000.00 in bonds and to pay $40,000.00 in bonds for the rights of the Yorba irrigators. While those in control of the Anaheim Union Water Company had acquiesced in the sale of their system, a number of the larger shareholders and the irrigators at Yorba strongly objected to relinquishing to the district their water rights acquired about 1858 for fear that the water was to be spread over a too large area. A bond issue of $600,000.00 was, however, carried, but while the directors were considering and were about to consummate its sale, feeling became more bitter and the opposition redoubled their efforts, charging the directors with inefficiency and inability to handle so much money, and claiming that the bonds would be sold at a heavy loss, and the section irretrievably ruined. Taxpayers in the city of Anaheim, which was included in the district, joined with the opposition. Finally, some of those who had been active in favor of the district went over to the opposition and the long fight was given up.[1] The district was dissolved by the superior court of Orange County September 12, 1895.

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[1] The area served by Anaheim Union Water Company, which is a mutual company, is now in a highly prosperous condition. Investigations of the use of water from Santa Ana River in 1912 showed a total of 13,000 acres being irrigated by this company, with a supplemental supply being provided to 5,245 acres from private wells. All of the land included in the old irrigation district has not, however, been watered. While during its formative period the district enterprise greatly inflated land prices, and in that way caused some heavy losses, the efforts to form it probably had as their chief result a valuable addition to the experience of the irrigators about Anaheim in managing their own irrigation affairs.

DISTRICTS ESSENTIALLY SPECULATIVE.

For the first three years after the passage of the Wright act no one used it as a cloak to cover up speculation. On the contrary, while many of the districts started during those years undoubtedly should never have been started, and regardless of the undue optimism of their organizers, there is ample indication that the purpose prompting their formation was essentially a *bona fide* and constructive one. To those who recall the frenzied wave of land speculation, especially in southern California, that culminated during the early nineties, it is not at all surprising that the Wright act should have been made use of as an agency in that speculation. The spirit and purpose of the act plainly limited its use to existing communities desiring, over the objections of an obstructing minority, to use the taxing power and the power of eminent domain to obtain or improve an irrigation water supply. Not being framed to cover purely speculative enterprises, no safeguards against its misuse were thrown around it, and it readily became an easy tool in the hands of manipulators. It is of no particular consequence at this time whether those who misused this law were honest or dishonest, nor will anything be gained at this time by criticizing their ethics. The period was a hopeful one and in the confidence men felt in the future some things were done that probably seemed proper then but which would not be countenanced now. So far as concerns some of the districts classed as essentially speculative, that is probably the most that can be said, and as to some even that probably is not justified. However, whatever of value is to come from a history of these old enterprises must come from a plain recital of how they operated and by what means they brought discredit on the law and disaster whose effects are in some cases still felt to the communities they embraced.

The Wright Act was written to make it possible for a reasonable number of landowners in any community to bring to an issue the question of whether a means of irrigation should be provided, in spite of the opposition of large landowners who were content to farm their large holdings on a margin of profit per acre that would be prohibitive to the smaller farmers. So it was provided that "fifty, or a majority of the holders of title, or evidence of title," might propose the organization of an irrigation district. Fifty or a majority in a section already under cultivation was quite sure to represent a substantial interest, but fifty or a majority of dummy entrymen or purchasers, or even of *bona fide* entrymen or purchasers in a desert country brought in or "colonized" merely to make possible the initiation of an irrigation district, might represent no substantial interest whatever. So also two-thirds of all of the electors in a section already under cultivation, when called upon to decide as to organization, or a majority, when called upon to authorize a bond issue, were likely to stand for an interest sufficiently large to justify going ahead or trying to do so. On the other hand, two-thirds or even a majority of the electors in a "colonized" desert section were quite sure to represent but a very small percentage of the ultimate settlers who must pay the principal portion of any bonded indebtedness incurred.

Of the eleven districts classed as essentially speculative only Big Rock Creek and Little Rock Creek are now active, the former having been revived in 1914 and the latter about 1910. The present status of these two districts is described in connection with active districts but an outline of their early history and failure and of the history and failure of the other nine are briefly given below.

SUNSET.

The guiding spirit of this district was a promoter, aided by a group of people in Fresno and Selma. Its chief historical interest lies in what may charitably be looked upon as an approach to the grotesque.

Sunset irrigation district covered a strip of desert from one to twelve miles wide and about seventy miles long, extending from near Mendota to Tulare Lake. Although a few had attempted from time to time to establish homes there, the land included was almost wholly owned by nonresidents, with alternate sections railroad land. To accomplish organization a quarter section was subdivided into small lots and either given away or sold at nominal prices to those who would agree to vote for organization. Probably it was also prearranged that bonds should be voted, for a $2,000,000.00 issue was easily carried within three months of organization.[1] In general the scheme proposed by the promoters was to take water from Kings River by way of Summit Lake, irrigating 87,000 acres by gravity and 178,000 by pumping from Fresno Slough by means of seventeen 44-inch centrifugal pumps raising water through four 11-foot lifts. Cereals, it was stated, would never need but one flooding and six inches added to the natural rainfall would be ample. Grasses were to be served three times with four inches in depth at each wetting, "one foot to each 250 acres of land." The system was to include 500 miles of earthen channels and utilize 3,000,000 feet of lumber, and the gross water duty was figured at one acre-foot per acre. Unfortunately the engineer did not specify how he was to take care of seepage losses. Nevertheless, he was paid $20,000.00 in bonds for his services. He should have been satisfied, however, for only $300,000.00 in bonds was paid for rights of way and reservoirs and

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[1] It is quite evident from the record of the district that the plans of the system and its cost were worked out to the satisfaction of the promoters before the enterprise was started and it was apparently their desire to call for a bond issue at once. However, their attorney advised the directors at their first meeting "that it would not look right to order an election on bonds at the first meeting of the board," and accordingly this formality was postponed for two months.

"water rights" on Kings River calling for 3,000 cubic feet per second after previous claims were satisfied, but with the title to any of the 3,000 cubic feet per second apparently never having been perfected either by use or court decree.[1]

In the heyday of its hope the directors of Sunset irrigation district were in no wise modest regarding the virtues of their enterprise. In an undated printed prospectus issued some time after October, 1896, (the last date mentioned in the prospectus) some quite elaborate and variegated penwriting was resorted to in describing the results of irrigation at Riverside, "but" adds the prospectus, "with all its grandeur, Riverside can not compare in soil, climate, or any of nature's gifts, with Sunset."

Even after a lapse of nearly twenty-five years, and also even granting that many, acting in entire good faith, were prompted through misinformation or absence of information to attempt the impossible under the Wright act, it is difficult to look with patience on the operations of those who promoted and managed this district. Even as early as February, 1892, a prominent San Francisco bank had characterized Sunset district as a fraud. The most cursory public supervision, it would seem, should have prevented this district from ever being formed, saying nothing of the operations subsequent to organization.[2]

MANZANA, LITTLE ROCK CREEK, AND BIG ROCK CREEK.

In the activity under the Wright act, Mojave Desert, or Antelope Valley, was not overlooked. Of six districts formed there between 1890 and 1895, Manzana, Little Rock Creek, and Big Rock Creek have been classed as speculative, for they were all promoted by companies or individuals desiring to sell land and who either were misled by the extranormal water supply in sight during the late eighties, or took advantage of the unusual conditions of those years to consummate their plans. In each case "colonization" was necessary before a district could be organized, and in each water rights held by the promoters or acquired by them for the purpose were traded for district bonds. In each case, after considerable areas of land had been sold to nonresidents and in many instances planted to orchards, the water supply failed as the dry years of the nineties came on, and with this condition there was in each case a default in payment of taxes and in the meeting of bond interest and finally an exodus of the settlers. Manzana district disposed of about $40,000.00 worth of bonds, Little Rock Creek about $88,000.00, and Big Rock Creek in excess of $223,000.00. The water supply in Manzana district which purported to be sufficient for 3,000 acres dwindled in the dry years until there was sufficient only for domestic use on a few farms. Big Rock Creek district covered about 30,000 acres and the several hundred people said at one time to have resided in the district were reduced by the drouth to a very few, irrigating only about 100 acres. In Little Rock district the area embraced was 4,100 acres, including about 1,300 acres of unpatented land. By installing a pumping plant near the intake of the district ditch the people of this district were able to tide over the dry years with a water supply apparently somewhat below 100 inches. Almonds largely made up the orchard crop planted in all three of these districts, and as a rule the land had been planted by the promoting companies and sold to eastern buyers who had never seen the land, with agreements to maintain the orchards for a stated number of years.

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[1] The record of the district indicates that quite early in its history some doubt arose as to the legality of the organization procedure that was followed. When the district was organized, as already stated, a tract within the district was subdivided and the parcels thereof sold or given away to those who would agree to help carry the election on the organization. On October 24, 1891, the attorney for the district wrote to the promoter in a much disturbed state of mind over the fact that some one connected with the district had expressed his doubts about the "freeholder proposition," meaning the colonization of "freeholders" to carry the election. "If it should come to the ears of the judge," the attorney stated, "he might feel called upon to institute an inquiry when otherwise a decree (of confirmation) would certainly be entered on the record showing." Evidently the promoter and the attorney resolved all doubts in favor of the district, for they were able to satisfy the superior court with the evidence presented and to secure a decree of confirmation. This decree, however, might well have been based on safer grounds, for when, after paying assessments for several years and seeing nothing accomplished, and after seeing interest on outstanding bonds defaulted, the nonresident landowners and the bondholders took the matter in hand, they had no difficulty in getting the decree set aside as a fraud on the court and the district declared null and void.

[2] On several occasions the board issued warrants to pay the interest on some of the bonds that had been disposed of, but in September, 1893, the directors decided that it was not advisable to levy an assessment to pay interest on bonds. The directors subsequently obtained an opinion from their attorney on the matter, which held that there was no doubt as to the meaning of the law, which required an annual levy to pay interest where there were outstanding bonds. "In the case of Sunset district, however," the attorney stated, "it seems to me it must have been apparent to those who took bonds of the district that the district would be unable to pay until the water should be applied to the lands. If such was the case they will, of course, feel no disappointment if accrued interest be not provided for until the water has been applied to the lands."

Manzana district has never been rehabilitated and its bonded indebtedness is still unsettled, with no plan of settlement in view, and with but a very small acreage now irrigated. In Big Rock Creek district a second effort was made to colonize the area by an eastern colonization company which had acquired a considerable area in the district and which is said to have taken some part in supporting the original colonization movement. In consideration of receiving additional district bonds, estimated at from $30,000.00 to $50,000.00 par value, this second company undertook to increase the water supply by driving a tunnel 2,600 feet into the bed of Rock Creek. Here again, however, failure was met, for only a small quantity of water was obtained and the settlers whom this second colonization movement had brought in also abandoned their holdings and moved away. A third effort to occupy the district was made in 1914 when a group of Los Angeles socialists began the establishment of a socialist colony there. The present status of this movement is given elsewhere. By getting the supervisors of Los Angeles

County to appoint a new board of directors for the district those back of the present movement were able to resuscitate the old organization. February 3, 1915, a new board was elected by the people. The present promoting company has acquired about $60,000.00 par value of the old bonds and has located an additional amount of $65,000.00, and suits are now pending in the Los Angeles County superior court to obtain judgments on some or all of the bonds. Little Rock Creek district has also recently been rehabilitated. About ten years ago the few settlers who remained after the exodus of the nineties formed a mutual water company and undertook to acquire the old district works and in this connection petitioned the court for dissolution of the district. Being objected to by some of the bondholders, however, this plan was abandoned and a movement started to revive the district. An agreement was made with the bondholders by which the $88,000.00 of bonds that had been issued should be funded with $25,000.00 of new bonds, and in September, 1910, new bonds for the purpose were voted and also bonds to the amount of $35,000.00 which it had been stipulated should be used in improving the irrigation system. What has been done under this compromise and what has been accomplished in the way of agricultural development of the district are both told later in this report.

PERRIS AND ALESSANDRO.

The first to be formed of the Wright districts classed in this report as essentially speculative was Perris, which dates from June 2, 1890. About six months later it was followed by Alessandro district. These two districts strikingly illustrate some of the worst features of activity under the Wright act. The history of both of them is closely interwoven with the history of the various companies that were organized to exploit Bear Valley reservoir. Both seem to have been operated on the theory that the purpose in view justified any means necessary to accomplish it. Both passed through brief but stormy careers and both ceased activity with the failure of their supposed water supplies. Finally, twenty years after they ceased activity, their bonded indebtedness has been disposed of, in the one case by having judgments amounting to $567,300.00 compromised at about 40 cents on the dollar, and in the other case by being held uncollectible because the bondholders had had notice in the printed prospectus of the district that the bonds were delivered to Bear Valley Irrigation Company "not for water, but for an executory contract to deliver water in the future."

Prior to the organization of Perris district land about Perris was mostly in small holdings and to a considerable extent was being hazardously dry-farmed to wheat and barley. The organization election was carried by 81 to 2, as was a bond issue of $442,000.00 shortly thereafter by 69 to 1. Later it was found that of 59 signing the petition for the formation of the district, only eight were bona fide freeholders. At the time of organization no one had any clear notion as to where a water supply could be obtained, but every one was optimistic. Soon attention was centered on Bear Valley reservoir, some believing that the promoters of Bear Valley reservoir had instigated the formation of the district in order to get its bonds for development purposes, as was the case with Alessandro district. At any rate, when visiting Bear Valley dam and "while standing on that magnificent piece of masonry" it was agreed that that "gigantic reservoir" furnished "the safest, best, and most feasible system of water supply yet examined," and that if it could be had at satisfactory cost, "their land should have no other." On January 20, 1891, the district contracted with Bear Valley Irrigation Company for the exchange of $240,000.00 in bonds for "Class B" water rights in Bear Valley reservoir. About the same time they began the construction of a conduit to the district and a distributing system, the entire works of the district being then estimated to cost $710,000.00. By the exchange of bonds for material and labor, by the issuance of warrants and their later redemption in bonds, and by purchasing a portion of the pipe system as "real estate" after it had been laid, some $200,000.00 in bonds was expended on construction work and one main pipe-line and distributing mains in the district were built. As a result of this activity water was delivered for a year or two by Bear Valley Irrigation Company, when the dry years of the early nineties came on. Then, however, the "Class B" rights for which the district had exchanged $240,000.00 in bonds turned out to be paper rights only, for all of the water supplied by Bear Valley reservoir was insufficient even for the holders of "Class A" rights about Redlands, Crafton, and Lugonia, and for reasons given more fully in connection with Alessandro district, Bear Valley Irrigation Company passed into the hands of a receiver. Orchards that were just getting nicely started died and the optimism that had thus far carried the organization along now turned into an intense depression. Many abandoned their holdings and at least twenty houses, it is said, were moved to Riverside. With the failure of Bear Valley Irrigation Company all hope of saving Perris district was abandoned.

The gradually increasing strife among the proponents and the opponents of Perris district furnishes one of the most interesting phases of the history of early California irrigation districts, and also indicates the utter futility of attempting to carry through an irrigation district in a community bitterly divided against itself. Only a few cool heads, it is stated, at one period prevented bodily encounter; one threat to kill on sight is mentioned in the data that have been gathered. Each side grasped at the slightest chance to check or discredit the other. The opposing group, forty or fifty strong, organized a branch of the Knights of Labor and held weekly meetings in the seclusion of the neighboring foothills. In this step they were met by the formation of the "Patterson Guards," made up of about an equal number who were supporting the district. Each organization is said to have been on a military footing with every member armed. Suit was brought to oust one member of the board of directors of the district on the charge that certain of his acts were illegal. He was arrested, but was surreptitiously tried, it is stated, by a friendly justice sitting at a "haymow" trial, and acquitted. On one occasion some of the "antis" had the entire board arrested and taken to San Diego for trial. A charge against the proponents of the district, alleged in a later suit, involved bribing the lawyer hired by the "antis" to fight confirmation proceedings to stay away from the trial. Finally, a source of bitter contention was the control of the local newspaper. At the start it was in the hands of those promoting the district, but the editor later went over to the other side, as did also the ownership, and from that time on bitterly attacked those in control. On one occasion the editor and proprietor of this paper and one of the "anti" directors had the pleasure of having themselves burned in effigy.

Alessandro district was even more closely identified with the Bear Valley Irrigation Company and its predecessors than was Perris. The original company, known as the Bear Valley Land and Water Company, was organized in 1883. This company first constructed Bear Valley dam at a reported cost of $75,000.00 and sold first rights to the water impounded to the landowners about Crafton, Lugonia, and Redlands.

In 1890 the Bear Valley and Alessandro Development Company was formed and it acquired a majority of stock of the first company, and also about 21,000 acres of land about Alessandro and Moreno, in San Jacinto Valley, which it proposed to supply with water by constructing a second dam in Bear Valley about 200 feet below the first dam, this new structure to increase the capacity of the reservoir to 80,000 acre-feet. In order to finish this larger project the development company promoted Alessandro irrigation district, all of the organization expenses of which it paid and which it dominated from the first. According to a prearranged plan the district forthwith voted bonds to the amount of $765,000.00, which it turned over to a second new company, known as Bear Valley Irrigation Company, which in the meantime had taken over the two former companies. In consideration of the $765,000.00 bonds of the district, Bear Valley Irrigation Company issued to the district more "Class B" water-right certificates and contracted to enlarge Bear Valley reservoir as previously indicated and to build conduits to and through the district, both the reservoir and the conduits, however, to remain the property of the selling company. All distributing works other than the main conduits were to be built by the landowners. According to allegations in one of the suits later brought against the district, three-fourths of the petitioners for the formation of the district, including two of those subsequently elected to the first board of directors, were employees of the selling company, and the engineer of that company was also made the engineer of the district. Thus, in return for $765,000.00 in bonds, most of which were disposed of in England and Scotland—some at a premium—the district obtained merely the "right" to receive water from works as yet unfinished, and as to the sufficiency of which there were no substantial data available, although the principal consulting engineer employed reported in a highly optimistic printed prospectus that the company could and would fulfill its contract to supply the district.

Apparently Bear Valley Irrigation Company started out with a show of keeping its agreement, but if data that have been collected and allegations in various suits can be depended upon as correct, much of the money ($130,000.00, July 1, 1891, $209,350.00 in 1893, and other amounts not mentioned in the records at hand) obtained from bonds and from other sources was used in paying dividends instead of for construction, although Bear Valley Irrigation Company had laid the foundation for the proposed new Bear Valley dam in a substantial manner in 1893, and had also built a conduit to the district carrying something less than 1,000 inches. By December, 1893, however, Bear Valley Irrigation Company was completely wrecked and passed into the hands of a receiver, together with all of its promises, and the district found itself with absolutely nothing for its pains and its $765,000.00 in bonds. For a few years the district had collected district taxes and paid bond interest, but with the failure of the promoting company and its prior default in carrying out its contract, payment of both taxes and interest ceased. For a few years the receiver operated the portion of the system that had been built, but the dry years, beginning in 1895, demonstrated that the water supply was wholly inadequate, and that the "Class B" water-right certificates were but "mere phantoms" and represented nothing more than the vision of the promoters. After the utter failure of the water supply land prices that had risen from $10.00 an acre to $125.00 dropped to practically nothing, and nearly all of the five hundred families said at one time to have lived in the district moved away. If we can accept the view of one thoroughly familiar with the early history of Alessandro district "there probably never was a place that suffered as that did."[1]

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[1] Perris district has been involved in much interesting litigation. In early days the organization of the district and its bond issues were confirmed in various suits, although it was later claimed that fraud had been practiced in one of them. In *quo warranto* proceedings started in 1897 the district was declared illegally organized and its rights forfeited, but this decision was reversed by the supreme court (*People* vs. *Perris Irrigation District*, 132 Cal. 289). In a later supreme court case (*Leeman* vs. *Perris Irrigation District*, 140 Cal. 540) it was held that no action can lie on bonds given for warrants in payment of labor and salary claims when the bondholder knew that the statute was being violated in the disposal of the bonds. Suits to collect from the district have mainly been brought in the United States

RIALTO AND CITRUS BELT.

These two districts, like Perris and Alessandro, were twin promotion schemes, being organized in October and November, 1890. The enterprise back of them was the Semi-Tropic Land and Water Company. The 20,000 acres embraced in the two districts were purchased by that company at a low figure—the market price at the time in small holdings was about $25.00 per acre—and was to be sold at $175.00 and $200.00 per acre after a water supply should have been provided through the organization of the two irrigation districts. By selling off a number of small holdings enough voters were got in to organize the districts and to vote bonds—$500,000.00 in Rialto, and $800,000.00 in Citrus Belt. Thereupon the company obtained agreements by which it should furnish water to the districts at the rate of about one inch to each seven and one-half acres. Work on the Rialto system was started at once and after a number of years of effort about two-thirds of the total water supply contracted for was developed and a considerable portion of the distributing system built. By the spring of 1894, however, the narrow margin of working capital on which the promoting company had attempted to operate forced it into the hands of a receiver. This crisis

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courts. In a case carried to the circuit court of appeals (*Board of Supervisors et al.* vs. *Thompson et al.*, 122 Fed. 860) a judgment directing the issuance of a peremptory writ of *mandamus* to compel the supervisors of Riverside County to levy an assessment as provided in section 39 of the irrigation act of 1897 to pay a judgment against the district was affirmed but no collections were made under that decision. (Other federal cases involving Perris district bonds were *Miller* vs. *Perris Irrigation District*, 85 Fed. 693; *Miller* vs. *Perris Irrigation District*, 92 Fed. 263; *Miller* vs. *Perris Irrigation District*, 99 Fed. 143; *Thompson* vs. *Perris Irrigation District*, 116 Fed. 769, and *Perris Irrigation District* vs. *Thompson*, 116 Fed. 832.) In 1913 section 39 of the act of 1897 was amended to make it the duty of district attorneys to act in case of the failure of boards of directors to levy assessments required by law to be levied, and the amendment was held valid by the superior court of Riverside County on April 2, 1914, and the supervisors were ordered to levy an assessment against the lands of the district to pay numerous judgments then outstanding. In October, 1914, and again in March, 1915, levies were made by the supervisors of Riverside County to pay judgments aggregating about $455,000. These assessments, however, were made pursuant to a compromise with the bondholders by which judgments aggregating $569,300 were settled for about forty cents on the dollar, and July 2, 1915, was set as the day for burning the bonds the above judgments covered.

Alessandro district was also in litigation throughout its existence and even down to 1913, more than thirty cases involving it being of record. The organization of the district and the bond issue were first confirmed and later declared illegal on account of irregularity, the supreme court in deciding this latter question holding that the board of directors had "no power to give all the bonds of the district for a mere personal promise of another that it will in the future lease some water to the district at a stipulated rent." (*Stimson* vs. *Alessandro Irrigation District*, 135 Cal. 389.) In 1905 what purported to be dissolution proceedings were carried through in the superior court of Riverside County without notice to the bondholders. On learning of the purported dissolution, however, bondholders representing claims aggregating $600,000 brought suit to have the decree of dissolution set aside and for judgment on their claims. The decision in this suit, entered in January, 1913, finally resulted in wiping out the entire bonded indebtedness. Not only did it throw out the dissolution judgment of 1905 as "void and a fraud on the court," but it declared the bondholders could not collect because, as previously indicated, they had had notice in the printed prospectus of the district that the bonds were delivered to Bear Valley Irrigation Company "not for water but for an executory contract to deliver water in the future." The confirmation judgment of 1891 was held void "for want of jurisdiction," and the judgment in the *quo warranto* proceedings of November 18, 1898, was declared valid and held to have terminated the existence of the district. With this judgment future action by the bondholders was dropped and the bonds have since been burned.

terminated all effort to carry out the contract with Citrus Belt district and the bonds of that district, previously trusteed, were returned to the district and the district subsequently disorganized after paying off its outstanding warrants at 50 cents on the dollar. The agreement with Rialto district, however, was assigned to the promoting company's contractor, and he continued work on the system, in all laying about seventy-five miles of pipe. Up to this time and for another year the district continued to levy assessments and to pay bond interest, but in 1895, when the dry period came on and the artesian wells that had been sunk ceased to flow, the people became discouraged and refused longer to pay their district taxes. Many of the orchards began to die and to save themselves those using water formed the Citizens Mutual Water Company and by boring additional wells and installing pumping machinery, developed sufficient water gradually to develop a prosperous community around Bloomington, the mutual water company continuing the use of the district distributing system. Later the Citizens Water Company was reorganized under the name of Citizens Land and Water Company, which is still operating the system. In the meantime, although inactive, the district has maintained its organization. The old bonds of the district, however, of which about $411,000.00 were issued, have not yet been settled, although heavy judgments have recently been given in the United States district court, and the collection of these and suits covering additional claims are still pending.[1] The Citizens Land and Water Company gathered up about one-half of the old bonds at reported prices ranging from 12 to 25 cents on the dollar, and offered in 1909 to assume the remaining outstanding indebtedness, then amounting to $260,000.00, on condition that all of the property of the district should be deeded to the company and the district disorganized, this proposal having been made after agreement and conference with the bondholders. When the proposition was submitted to the electors of the district, however, in 1910, it failed of approval by a vote of 54 to 71.[2]

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[1] Following the judgment referred to, Rialto district obtained the passage by the legislature of 1915 of an amendment to section 39 of the irrigation district act, the amendment providing "that in any district organized prior to 1891 the amount to be levied for the purpose of paying any judgment or judgments, shall not exceed the sum of $25,000 in any one year * * * ." Other similar attempts have been made to legalize what would have very strongly suggested repudiation, but the amendment submitted by Rialto district was the first one to pass the legislature. This amendment, however, did not receive executive approval. In judging of these efforts to obtain legislation that would lessen the burden of the landowner on account of the old district bonds, it should perhaps be remembered that the present landowners are not the ones who organized the district, and that present bondholders probably obtained the bonds as a speculation at a very low figure.

[2] Citrus Belt district was involved in no litigation of consequence, it having been saved that trouble by the wise advice of its attorneys that bonds could not be exchanged for work. Conditions have been quite different, however, in Rialto district. In an early case (*Rialto Irrigating District* vs. *J. R. Brandon et al.*, 103 Cal. 384) it was held that the provisions of the Wright act referring to the construction of "ditches and canals" and giving a district power to condemn property necessary for works were broad enough to include pipe lines, flumes, or other conduits

MURRIETTA, LINDA VISTA, AND JAMACHA.

These three districts were formed in 1890 and 1891, the years of greatest activity in organizing under the Wright act. Murrietta district, then in San Diego County, although embracing 14,000 acres, was unimportant and accomplished nothing beyond sinking a single artesian well, and without voting any bonds, or incurring indebtedness, that could not readily be paid, ceased activity and was dissolved. It had been formed, in the first place, by a local land company that had acquired some 2,200 acres for subdivisional purposes. Jamacha district, originally promoted as Spring Valley district, was more feasible and if properly managed could have succeeded for at least a part of the area included. This district was promoted by the owner of certain properties it was desired to sell to the district and by the owners of land who hoped to reap a profit in subdividing their holdings. The water supply disposed of to the district included the Barrett damsite, at which point water from Cottonwood and Pine creeks was to be impounded. These properties were purchased for $100,000.00 in bonds which were a part of a $700,000.00 issue that had been voted. An adverse bank report stopped the disposal of any further bonds, but at this juncture the properties that had been acquired were taken over by the Southern California Mountain Water Company and the bonds traded for them returned to the district. The district was finally dissolved May 5, 1909.

Linda Vista district, covering 42,600 acres on Linda Vista mesa north of San Diego, was similar in some respects to Jamacha district and was promoted somewhat in the same way—that is, those behind it were chiefly holders of mountain storage and appropriation rights and those who wished to increase their profits in real estate. In the general ignorance of irrigation matters common to the time, some outsiders rushed in in entire good faith, expecting to make quick fortunes. Their illusion, however, was not long-lived, for the financial plans of this district failed along with those of others, and no bonds were disposed of other than those traded to the promoters for filings on Pamo Creek and Santa Ysabel River, a storage site in Pamo Valley, and small areas and rights in Santa Maria and Dye valleys, in all $176,000.00. These old bonds hung over the district for twenty years, but were finally disposed of and the district dissolved April 15, 1914. During

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usually employed in works of the kind for conveying water. In a lower court case in *Stowell* vs. *Rialto Irrigation District*, bonds received by the contractor from the Semi-Tropic Land and Water Company were held invalid on authority of previous supreme court decisions (*Hughson* vs. *Crane*, 115 Cal. 404; *Stimson* vs. *Alessandro Irrigation District*, 135 Cal. 389, and *Leeman* vs. *Perris Irrigation District*, 140 Cal. 540) because the contract of the company provided that bonds of the district were to be issued in part at least for construction work. On appeal, however (155 Cal. 215), this decision was reversed, the court saying in effect that where a district enters into a contract for the transfer to it at different times of specific water rights with completed pipe lines and rights of way, to be paid for in bonds to be issued only on delivery of a deed conveying the property, the bonds are valid.

the interval, litigation had reduced all of the district's debts to judgments, all of which were acquired by a local corporation. This corporation returned $55,000.00 of the old bonds in exchange for the water properties purchased by the district twenty years previously for $176,000.00 in bonds, the remaining indebtedness being compromised for a total of $125,000.00 that was raised by assessment.[1]

Conceived in speculation, although honestly supported by many; far in advance of a legitimate demand for the development it would make possible, bitterly opposed by the owners of some of the larger holdings embraced, based on too meager water supply and cost data in those early days of western irrigation engineering, ill-timed and managed by men either inexperienced in large affairs or not disinterested, Linda Vista district tested the weaknesses rather than the constructive possibilities of the act under which it was created. Even with a water supply unquestioned and certain it would have been too large an undertaking to be economically and successfully carried through by nonresident landholders mostly waiting for a chance to sell out. That it failed when it did is without doubt to someone's great advantage.

THE IRRIGATION DISTRICT ACT OF 1897.

By the close of the first decade of operation under the Wright act the necessity for a radical revision of that act was fully apparent. The numerous amendments and supplemental acts that from time to time had been adopted had been drafted more with a view to meeting local needs of particular districts or to clearing up doubtful provisions, than to correcting abuses. The abandonment or complete collapse of all but six of the forty-nine districts organized, and the critical financial difficulties of all but one of those six, so discredited irrigation districts and the securities they were dependent on that friends of the district movement, particularly those connected with the few districts for which there was still some hope, in 1897 set about rewriting the original act in such manner as to make a repetition of previous disasters impossible. The Wright act had not failed because of what it contained so much as because of what it did not contain. In a time of less speculation and of less financial stress it could have well sufficed in those situations that had inspired it and to meet which it had been drafted. With complications arising from the speculative districts and from the financial panic of the nineties eliminated, such districts as Modesto, Turlock,

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[1] Linda Vista District was involved in litigation from the start, including obstruction suits, suits to enjoin tax sales, a suit by the city of San Diego to be relieved from district taxes (first decided in favor of the city, but reversed by the supreme court in *San Diego* vs. *Linda Vista Irrigation District*, 108 Cal. 189), suits to enforce the payment of bond coupons and warrants, an individual suit to dissolve the district, and *quo warranto* proceedings to set aside the district organization, the latter being decided in favor of the district both in the superior court and in the supreme court in *People* vs. *Linda Vista Irrigation District*, 128 Cal. 477.

Madera (on a smaller scale), Alta, Tulare, Happy Valley, and Browns Valley, in Sacramento and San Joaquin valleys, and a few in southern California would have succeeded without great difficulty, for the bringing in of water would gradually have broken down local opposition. The time had not come, however, when communities unused to working together or to the management of large affairs could withstand both the critical industrial conditions of the nineties and the bitter onslaughts that were made on the basic act under which they were attempting to operate. The decision of the United States supreme court sustaining the constitutionality of the Wright act,[1] following a decision in the lower federal court holding the act unconstitutional,[2] was delivered November 16, 1896, after previous argument by some of the foremost lawyers of the times, including a former president. Thus, those who went to the legislature of 1897 with a redraft of the act did so with knowledge that its fundamental principle was at last unassailable.

The essential character of the Wright act was not affected by the amendments of 1897. While the original act was repealed, the new act was in many of its provisions but a slight verbal revision of the old one, with the three separate confirmation, inclusion, and exclusion acts of 1889 added. Radical changes were, however, made in the procedure for organization and for incurring indebtedness. Instead of giving to fifty or a majority of the landowners in any proposed district the right to initiate such district before the supervisors, the amended act required "a majority in number of the holders of title or evidence of title to lands susceptible of irrigation from a common source and by the same system of works, representing a majority in value of the lands," and for the former provisions permitting the boards of directors to call bond elections and to acquire water rights and works and other property necessary therefor without restriction, the amended act prescribed that a petition signed by a majority of the landowners, representing a majority in value of the lands, should precede the calling of any bond election and any purchase of works or other real property at a price exceeding $10,000.00.[3]

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[1] *Fallbrook Irrigation District* vs. *Bradley*, 164 U. S. 112.

[2] *Bradley et al.* vs. *Fallbrook Irrigation District et al.*, 68 Fed. 948.

[3] Among the more important of the other new features in the act of 1897 were the following: Provision for right of appeal to superior court on order of supervisors on organization petition; provision for contest of election on organization; provisions for consolidation, where desirable, of certain offices and for fixing by boards of directors of bonds of treasurer and collector; provision for annual financial statements; provision that directors need not reside in division from which elected; provision that assessments to complete works when there should be no money in the construction fund and no bonds should be voted could only be levied after first having been approved by a majority vote of the electors; exemption of district property from state and county or municipal taxes; provision that bonds should bear five instead of six per cent, that they could not be sold below par, and that they should be paid from the twenty-first to the thirtieth years instead of from the eleventh to the twentieth. In addition, the act of 1897 omitted, among other things, the former provision that district bonds could be used at their par value in payment for lands, water rights, etc.

IRRIGATION DISTRICT LEGISLATION SINCE THE ACT OF 1897.

Attention has already been called to the revision of the Wright act of 1887 that was embodied in the act of 1897. The restrictions imposed by the amended act on the organization of irrigation districts and on the incurring of indebtedness by boards of directors were planned virtually to stop new development under the law, and for more than ten years that was their effect. The legislature that substituted the amended law for the original Wright act also passed what is known as the funding act[1] under which irrigation districts were permitted to discharge their indebtedness with new bonds.[2] For the next four years the law was left unaltered, but beginning in 1901 and more particularly in 1909, 1911, 1913, and 1915, amendments and supplementary acts were adopted that have greatly changed and strengthened it, and while it is not yet in the final form desired by some of its friends it stands in many particulars as tested, workable, and satisfactory. Many of the changes that have been made have dealt mainly with matters of routine and detail. Some have been intended to meet the needs in individual districts. The more important of the changes of general application are summarized below.

BONDS.

The first amending act affecting bonds was passed in 1901[3] and related only to the funding act of 1897. This act amended three sections of the funding act and repealed six sections. Thereafter no legislation was enacted affecting bonds until 1911, when the first statute was passed providing for investigation and report on bonding issues by a state commission, composed of the attorney general, the state engineer, and the superintendent of banks. This initial act did not prove satisfactory and it was superseded a few months later by a new act,[4] but this in turn was superseded in 1913,[5] and was slightly amended in 1915.[6] The enactment of 1913 as amended in 1915 is now in force. In general it provides that on application from an irrigation district the state irrigation commission, composed of the attorney general, the state engineer, and the superintendent of banks shall investigate and report on essential matters having to do with the water supply of such district, the fertility and irrigability of its soil, the feasibility of its irrigation system, the market value of its water rights and works, the market value of the lands embraced, as to whether the aggregate amount of the authorized bonds outstanding or unsold exceeds 60 per cent of the aggregate value of lands, waterworks, etc., owned or to be built or acquired, and as to the number and amount of bonds available for the purposes of the act or that may be available. If the report of the commission is favorable the law provides that the bonds in question shall be certified by the state controller and that all bonds so certified shall be legal investments for all trust funds, and for the funds of all insurance companies, commercial and savings banks, trust companies, and for state school funds, and be placed on a par with bonds of municipalities, counties, and school districts, as to investment and security. Thus, in place of the unlimited authority of boards of directors, under the original Wright act, to issue irrigation district bonds with no report whatever as to feasibility, the state government has now provided that bonds of districts meeting the legal and financial requirements of a state commission, while not in any way endorsed by the state, shall be on a par for investment purposes with what are usually classed as standard securities.[1]

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[1] Statutes 1897, chapter CCLIV, p. 394.

[2] Under this act Modesto, Turlock, and Alta districts, and some years later, Little Rock Creek district, refunded their old indebtedness and otherwise reorganized. (*See* histories of these districts in text.)

[3] Statutes 1901, chapter CLIX, p. 514.

[4] Statutes 1911 (extra session), chapter III, p. 3.

[5] Statutes 1913, chapter 366, p. 788.

[6] Statutes 1915, chapter 419.

Changes in the bonding provision of the district law made in 1913 were important because, among other things, they marked a beginning in a larger measure of state supervision and radically changed the bond provisions.[2] By amending section 30 of the act of 1897 they provide that engineering estimates of the cost of new works shall be made by a competent irrigation engineer whose report must be submitted to the state engineer, the latter to report his conclusions within ninety days, particularly with reference to the water supply available and the feasibility of the proposed enterprise. This change was modeled after the Idaho law. While it does not give the state engineer veto power over a proposed bond issue, it requires his report thereon, and it is the presumption that no bond issue can be voted, or if voted, be sold, in the face of an unfavorable report from the state engineer. An amendment to section 31 makes the bonds payable from the 21st to the 40th years after issue, instead of from the 21st to the 30th years previously provided. The same amendment changes the rate of interest on irrigation district bonds from 5 per cent to not to exceed 6 per cent, the rate to be determined by the directors. An amendment to section 62 removes the prohibition against the sale of bonds for less than par and permits them to be sold to the highest responsible bidder. A new section (32½) provides that bonds authorized before the above amendment and not sold may be sold for less than par if such sale is sanctioned at a special election by a two-thirds vote. Another new section (54½) provides that during the construction of works under the proceeds of a bond issue the secretary of the district must within a week after each regular board meeting send to the state engineer copies of all reports on works under way, together with a financial statement, and gives authority to the state engineer to examine the affairs of the district at any time and to call for special information and reports thereon.[1]

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[1] The irrigation district commission has already passed favorably on bond issues for South San Joaquin, Oakdale, Modesto, Turlock, Anderson-Cottonwood, and San Ysidro districts, and has made investigations, as provided in the act, in Imperial, Alpaugh, and Terra Bella districts. Since this was first printed the commission has passed favorably on bond issues for Imperial district.

[2] Statutes 1913, chapter 578. The legislature of 1913 also passed the following: Statutes 1913, chapter 96, p. 107, amending section 1 of chapter 522, Statutes 1907, relating to deposit of money belonging to any county or municipality in any bank in the state, by including irrigation district bonds among the bonds that may be lawfully given as security for such deposit; Statutes 1913, chapter 97, p. 101, amending section 676 of the Political Code to permit the proceeds from the sale of state school lands under certain conditions to be invested in irrigation district bonds; and Statutes 1913, chapter 98, p. 108, amending section 3, Statutes 1907, chapter 50, p. 67, to permit the state treasurer under certain conditions to accept irrigation district bonds as security for state funds.

A bond amendment made in 1915[2] provides that in all cases subsequent to January 1, 1910, where directors have passed a resolution calling for a bond election and where four-fifths of the electors voting have favored such issue, and the directors have provided for it, all proceedings connected therewith and all bonds sold hitherto or later are valid.

ORGANIZATION.

The sections of the act of 1897 relating to organization were amended in 1909,[3] 1911,[4] 1913,[5] and 1915.[6] The most important of the amendments were made in 1911 and 1913. In 1911 holders of possessory rights under receipts or other evidence of the rights of entrymen or purchasers under any law of the United States or of California were made eligible to sign a petition for the formation of an irrigation district. At the extra session of 1911 section 4 was amended to abolish all right of appeal from the finding of the board of supervisors as to the genuineness and sufficiency of a petition and notice for organization, except by the state itself. The principal change in organization procedure was made in 1913, sections 2 and 3 being amended to provide that copies of petitions to boards of supervisors for the formation of irrigation districts shall be filed in the office of the state engineer together with copies of resolutions of the supervisors relating thereto, and also to provide for a report by the state engineer as to "whether any condition or conditions exist that would justify him in reporting against the organization of the proposed district." The amendment gives the state engineer but thirty days in which to file his report, and it is to be noted that the report called for is merely a negative one. These provisions, like those having to do with the report by the state engineer on proposed bond issues, already cited, were patterned after the Idaho law. If the state engineer reports unfavorably as to the feasibility of a proposed district no further action can be taken by the supervisors unless they be requested in writing by three-fourths of the holders of title or evidence of title to grant the petition; except that in lieu of such request the supervisors may modify the plans in accordance with recommendations by the state engineer. The act providing this supervision by the state engineer also amended section 61 to provide that before the collection of any assessment in any district the directors may incur indebtedness up to $2,000.00 for districts containing 4,000 acres or under, or in the case of districts exceeding 4,000 acres, to one-half as many dollars as there are acres in the district, up to $50,000.00, warrants bearing 7 per cent per annum (changed by Statutes 1915, chapter 696, to not to exceed 7 per cent) to be issued in payment of such indebtedness. A further addition to this section in 1911 specified that demand warrants presented when no funds were available should bear interest at the rate of 5 per cent; also that whenever money was available for payment of all outstanding demand warrants or whenever the directors ordered that all warrants presented for payment prior to a certain date be paid and money was available therefor, interest thereon should cease with the first date of publication of notice of these facts. By statute of 1915[1] the 5 per cent rate of interest on demand warrants after presentation for payment was changed to a rate to be determined by the board of directors, but not exceeding 7 per cent. The amendment affecting organization made in 1915 among other things specifies that lands covered in an organization petition need not consist of contiguous parcels and that in certain cases the "actual" owners of property shall be considered the owners for all of the purposes of the act, that owners of undivided interests may sign for such interests and that each owner shall be considered as one assessment payer, and that guardians, executors, administrators, or other persons holding property in a trust capacity may sign any petition provided for in the act when authorized to do so. Section 72 is amended to provide that in confirmation proceedings all findings of fact or conclusions of boards of directors or of boards of supervisors shall be conclusive unless contested within six months after such findings or conclusions are made.

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[1] The legislature of 1915 adopted a number of important amendments to the district act covering, among other things, matters pertaining to organization, co-operation with the federal government, and supervision by the state engineer. (Assembly Bill No. 1188.) Just before the end of the session a new section was added, in the interest of the proposed development in San Joaquin Valley, which would make a petition for the organization of a district sufficient if it should be signed by 60 per cent of the holders of title or evidence of title to the lands to be included, provided such 60 per cent should represent 25 per cent in value of such land. Opposition to this proposed new section and to at least one other feature, of relatively minor general importance, prevented the measure from receiving executive approval. The bill gave the state engineer veto power over the organization of new districts. Section 18 of the act of 1897 was amended to provide that water should be apportioned ratably only "as far as practicable," and the right of assigning the share due any taxpayer was taken away. Section 30 was amended to make more specific former provisions regarding the report of the state engineer on bond issues; also the petition necessary prior to calling of a bond election was eliminated and the number of votes necessary to carry a bond election was changed from a majority to two-thirds. Section 54½ was amended to provide more specifically than before for reports to the state engineer of progress on work being done with the proceeds of bond issues and a new section (54¾) made it the duty of the state engineer to give information to persons contemplating the formation of new districts and also to advise freely with the governing boards of organized districts. In all the bill amended seventeen sections of the act of 1897 and added four new sections.

[2] Statutes 1915, chapter 507.

[3] Statutes 1909, chapter 22, p. 12.

[4] Statutes 1911, chapter 317; Statutes 1911 (extra session), chapter 36, p. 139.

[5] Statutes 1913, chapter 578.

[6] Statutes 1915, chapter 696.

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[1] Statutes 1915, chapter 696.

ELECTIONS.

A number of changes have been made in the procedure covering elections in irrigation districts. In 1909[1] two sections were amended in matters of detail. In 1915[2] an addition was made to section 19 providing that if an election for officers is not held as provided by law a special election shall be called on petition of 10 per cent of the electors residing within the district. This amendment was made to meet a situation in one of the old districts organized in San Bernardino County. Up to 1915 section 5, relating to election of the first board of directors, provided that if requested in the organization petition to do so, boards of supervisors might provide for three instead of five directors, to be elected by divisions or at large, as specified in the petition. Section 28 formerly permitted boards of directors, on petition of a majority of the holders of title or evidence of title of a district, to change the number of directors to three or five, to be elected by divisions or at large as petitioned. By amendment in 1915[3] such action is made mandatory on petition rather than permissive, but it is provided that if elected at large the directors shall nevertheless be elected to represent separate divisions, of which they shall be residents. It is to be noted that section 26, which has not been changed, specifies that a director shall be a resident and freeholder of the irrigation district but not necessarily of the division for which elected. It is also to be noted that in practice, directors of all present California irrigation districts are residents of their respective divisions.

Two innovations, so far as concerns irrigation districts, that may be classed with sections dealing with elections were adopted by the California legislature in 1909 and 1911 (extra session)—nomination by petition, and the recall. Prior to 1909 the law made no provisions for nominations, but specified in section 22 that the provisions of the general election laws should not apply to irrigation district elections. Sections 22*a* and 22*b* were added in 1909,[4] specifying that ballots be provided with the names of candidates and that nominations can be made by petition of ten or more electors. At the extra session of 1911[1] section 28½ was added providing for the recall of any elective officer at any time. Under this amendment a number of recall elections have been held in Modesto and Turlock districts, and one has been held in Oakdale district, but only in two instances has such an election been successful.

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[1] Statutes 1909, chapter 692.
[2] Statutes 1915, chapter 677.
[3] Statutes 1915, chapter 696.
[4] Statutes 1909, chapter 692.

EXCLUSION OF LANDS.

By an amendment to section 78 of the act of 1897 adopted in 1905[2] a former provision that no lands within city or town limits and no lands subdivided therefor should be excluded from irrigation districts was eliminated. A further amendment to the same section in 1913[3] provided that lands irrigated by underground pumped waters and benefited by subirrigation from district irrigation or drainage works can not claim exclusion, but that they shall be assessable only for interest and principal of bonds if thus irrigated at the time of organization and still exclusively so irrigated each year. This amendment was passed to meet a situation in South San Joaquin district where the court of appeals had held that a certain landowner having a pumping plant was entitled to have his land excluded[4] A third, relatively unimportant, amendment to the same section was adopted in 1915.[5]

INCLUSION OF LANDS.

The provisions of the act of 1897 relating to inclusion of lands received their first amendment in 1915.[6] A series of provisos was added to section 90 permitting adjacent public land to be included without a petition and specifying that where the inclusion of land would injure land already in a district by the impairment of its water right or by increasing the expense of water, a priority of water right for the lands already in or additional annual payments or other just consideration from the lands to be included may be prescribed as conditions to inclusion. Section 91 was amended to require petitioners for inclusion to furnish an undertaking conditional on the failure of the inclusion elections.

SALARY OF DIRECTORS.

The act of 1897 allowed directors three dollars per day for time employed in district business. An amendment in 1909[7] substituted four dollars per day and an allowance of ten cents per mile traveled from the residences of the directors to the office of the board. A further amendment in 1915[1] adds a proviso that in irrigation districts containing 500,000 acres or more, directors shall, in lieu of a per diem allowance, each receive $150.00 per month. This amendment was added at the instance of Imperial district which at present is the only one to which it can refer.

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[1] Statutes 1911 (extra session), chapter 34, p. 135.
[2] Statutes 1905, chapter XXXIII, p. 27.
[3] Statutes 1913, chapter 367, p. 781.
[4] *Harelson* vs. *South San Joaquin Irrigation District et al.*, 128 Pac. 1010.
[5] Statutes 1915, chapter 506.
[6] Statutes 1915, chapter 696.
[7] Statutes 1909, chapter 692.

LEASE OF PROPERTY.

A statute passed in 1901[2] added section 15½ to the act of 1897, providing that boards of directors may lease the canal system of a district. This amendment was made at the instance of those seeking to take over the canal of the old Central irrigation district in Sacramento Valley. This section was amended in 1911[3] to extend the authority for lease of a system to any part thereof.

DISSOLUTION.

The original Wright act provided no means for the dissolution of irrigation districts and when an effort was made to dissolve Selma district shortly after its formation, the superior court of Fresno County held that it had no jurisdiction because of the lack in the Wright act. This decision was affirmed by the supreme court in May, 1893, which held that the general power of the courts to decree a dissolution of irrigation districts was no greater than in the case of municipal corporations proper, which the courts had no power to dissolve for failure to accomplish the purpose of their organization.[4] A supplemental act covering disorganization was passed in 1893 and amended in 1897, but was not incorporated in the general act of 1897, although probably not repealed by it. The matter was, however, covered by a supplementary act in 1903,[5] and this act was amended in 1909,[6] 1911,[7] 1913,[8] and 1915.[9] An amendment to the main irrigation district act of 1897, which adds section 47½, makes a further slight change. Under the act as amended dissolution of a district may be proposed by a majority of the real property owners representing a majority in value thereof. The petition of these owners must set forth all indebtedness of the district other than that barred by law prior to filing, the estimated cost of the dissolution, all assets of the district, and the proposed proposition for settlement, if assented to by the creditors of the district, or if a provision is made for the payment of creditors not assenting. The question of dissolution is then referred to an election which requires a two-thirds affirmative vote to carry, after which it is in the hands of the court. Section 7 of the act provides that a corporation may be organized to acquire the assets and operate the irrigation system of a district proposing to dissolve. Under this act at least fifteen of the old Wright districts have been dissolved.

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[1] Statutes 1915, chapter 696.
[2] Statutes 1901, chapter CCLXIX, p. 815.
[3] Statutes 1911, chapter 317.
[4] *People* vs. *Selma Irrigation District*, 98 Cal. 206.
[5] Statutes 1903, chapter V, p. 3.
[6] Statutes 1909, chapter 91, p. 139.
[7] Statutes 1911 (extra session), chapter 26, p. 118.
[8] Statutes 1913, chapter 39, p. 39.
[9] Statutes 1915, chapter 525.

ASSESSMENTS.

An act of 1909[1] permits boards of directors of irrigation districts to provide for the payment of assessments in two installments instead of one. It is specified in this act that assessments levied under section 34 of the act of 1897, providing for completion of works, shall not be affected. Otherwise, upon petition of a majority of the assessment payers in a district the board of directors may provide that assessments be paid in two installments instead of one. By another act,[2] section 35 of the act of 1897, relating to the duties of the assessor, is amended to provide that improvements on any lands or town lots within an irrigation district shall be exempt from taxation for any of the purposes mentioned in the irrigation district act and the word "improvements" is defined to include trees, vines, alfalfa, all growing crops, and all buildings or structures, with the proviso that the exemption of improvements for taxation shall not apply in districts organized at the time of this amendment without the approval by a majority vote of the resident holders of title to lands within the district subject to taxation therein. Another statute of 1909[3] provides that in the annual levying of assessments sufficient shall be included to pay in full the amount of any contract or obligation of a district which shall have been reduced to judgment. A statute of 1911[4] amends section 39 of the act of 1897 by requiring that in the annual levying of assessments the boards of directors shall add sufficient to pay in full all sums due or that shall become due from the district before the time for levying the next annual assessment on account of rentals or charges for lands, water, or water rights acquired under lease or contract. Another statute in 1911[5] amends section 59 of the act of 1897, which relates to special assessments, by adding three provisos at the end thereof: (1) that four-fifths of the board of directors of a district may by resolution levy in any one year an assessment up to two per cent of the assessed valuation within the district, but not exceeding $75,000.00 without a special election; (2) that a vote must, however, be taken on such assessment on petition of 15 per cent of the qualified voters in the district voting at the last preceding general election in the district; and (3) that in case of an unexpected emergency by which the flow of water in the district canal is interrupted, an indebtedness may by a four-fifths vote of the board be incurred not exceeding $40,000.00 in any one year. A statute in 1913[1] further amends section 39, relating to the levying and collection of assessments, by providing among other things, that it shall be the duty of the district attorney of each county in which the office of any irrigation district is located, to ascertain each year whether the duties relating to the levying and collection of assessments have been performed and on showing of neglect to so notify the board of supervisors or other officials required to perform such duties, and that on failure of the supervisors or other officials to perform the neglected duties the district attorney shall take such action in court as may be necessary to compel performance, provided that for the enforcement of the levying and collection of any assessment ''hereafter required to be levied and collected'' for the payment of any debt ''hereafter incurred,'' the attorney general of the state shall take appropriate action on failure of the district attorney to do so. A further act in 1913[2] amends sections 41 and 43 by providing that the penalty on delinquent assessments shall be 10 per cent instead of 5 per cent of the amount thereof. A statute passed in 1909[3] amended section 47 by providing that redemptions of property sold for district taxes could be made within five years from the date of sale or at any time thereafter before a deed had been made and delivered, in place of the two-year period previously allowed; also that where property had been sold to the district it might be redeemed at any time before the district had disposed of it. A further amendment in 1915[4] provides that directors may direct the district collector not to sell property on a delinquent list, but in lieu thereof to sue the owners in the districts named for collection. A supplementary statute passed in 1913[5] amends section 3653 of the Political Code by providing that on request county assessors must furnish to irrigation districts copies of assessment rolls covering lands therein.

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[1] Statutes 1909, chapter 274, p. 415.
[2] Statutes 1909, chapter 303, p. 461.
[3] Statutes 1909, chapter 55, p. 46.
[4] Statutes 1911, chapter 317.
[5] Statutes 1911, chapter 588, p. 1111.

POWERS OF DIRECTORS.

Changes relating to powers of directors of irrigation districts have been made in 1911, 1913, and 1915. The amendment in 1911[6] permits districts to acquire and hold the stock of other corporations owning waters, canals, waterworks, franchises, concessions, or rights. The change made in 1913 was in the form of a constitutional amendment which was adopted by the people in November, 1914. It authorizes irrigation districts, "for the purpose of acquiring the control of any entire international water system necessary for its use and purposes, a part of which is situated in the United States, and a part thereof in a foreign country," to acquire the stock of any foreign corporation "which is the owner of, or which holds the title to the part of such system situated in a foreign country."[1] This amendment was adopted to enable Imperial irrigation district to acquire that portion of the irrigation system of the California Development Company that is situated in Mexico. The same purpose actuated two amendments to the district law adopted in 1915[2] adding section 61*b* and section 61*c*. The former permits directors of irrigation districts of over 500,000 acres to acquire by purchase or condemnation an irrigation system supplying lands therein and where a part of such system lies outside of the state, to exchange district bonds for all or a portion of the system or for interest in or stock of a corporation owning such system; the latter provides that where directors have exchanged or agreed to exchange district bonds for property rights as authorized in the previous section the court shall in any proceeding under its provisions determine the validity of all bonds issued or to be issued under contracts for such exchange.

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[1] Statutes 1913, chapter 60, p. 59.
[2] Statutes 1913, chapter 578.
[3] Statutes 1909, chapter 284, p. 429.
[4] Statutes 1915, chapter 696.
[5] Statutes 1913, chapter 386, p. 814.
[6] Statutes 1911, chapter 317.

MISCELLANEOUS SPECIAL AND SUPPLEMENTARY ACTS.

In addition to amendments to the act of 1897 a number of special and supplementary acts have been passed affecting the irrigation district law of the state.

Drainage.—A statute of 1907[3] provides that irrigation districts may provide for drainage under the same laws that permit them to finance and construct irrigation works. Under this act drainage works have been built by Modesto and Turlock districts and a beginning has been made in South San Joaquin district.

Power.—A statute of 1911[4] amended section 1410 of the Civil Code of California relating to rights to water which may be acquired by appropriation by providing that no water for power may be appropriated for more than twenty-five years except by a municipal corporation other than an irrigation or lighting district, or by an irrigation district when for subsidiary use within its own limits, etc. This act has, however, been superseded by the water commission act of 1913.[5]

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[1] Session Laws 1913, constitutional amendments and concurrent and joint resolutions, chapter 95.

[2] Statutes 1915, chapter 655.

[3] Statutes 1907, chapter 298, p. 569.

[4] Statutes 1911, chapter 407, p. 821.

[5] Statutes 1913, chapter 586.

Agricultural Expert.—A statute of 1913[1] authorizes boards of directors of irrigation districts to employ agricultural experts and assistants to supervise the construction of works, advise with farmers, and conduct experiments.

Water Districts.—An act known as the "California Irrigation Act,"[2] which seeks to provide a policy relating to storage, diversion, and use of water, in cooperation between the state and the United States or otherwise, authorizes irrigation districts to reorganize under such act. This legislation was passed primarily in the interests of what is known as the "Iron Canyon Project" in upper Sacramento Valley and was amended to permit irrigation districts to reorganize under it at the instance of some of those seeking to consolidate into a number of cooperating irrigation districts all of the irrigation systems taking water from Kings River.

Legislative Validation of Irrigation Districts.—Beginning in 1911 irrigation districts in California have adopted the practice of obtaining special legislative acts of validation. Such acts were passed affecting Turlock district,[3] Oakdale district,[4] Modesto district,[5] South San Joaquin district,[6] and Imperial district[7] in 1911; San Ysidro district in 1913[8]; and Anderson-Cottonwood district,[9] Oakdale district,[10] La Mesa, Lemon Grove, and Spring Valley district,[11] and Waterford district,[12] in 1915.

Flood Protection.—An emergency act passed in 1915[13] in the interest of Imperial district provided that districts having an area of more than 500,000 acres shall have authority to construct levees and protect the lands within such districts from damage resulting from floods. For that purpose directors of such districts are given authority to spend money jointly with other agencies or alone, and it is provided that when bonds for flood protection have been authorized but not sold, directors may borrow the amount of such bonds and repay the loan out of bond sales, and in addition may borrow in any one year up to $200,000.00 at interest not exceeding 7 per cent. Under this act Imperial district borrowed $200,000.00 in the spring of 1915 for cooperation with the federal government and for independent action in flood control.

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[1] Statutes 1913, chapter 72, p. 75.
[2] Statutes 1915, chapter 621.
Statutes 1911, chapter 95, p. 261.
[4] Statutes 1911, chapter 96, p. 262.
[5] Statutes 1911, chapter 97, p. 262.
[6] Statutes 1911, chapter 98, p. 262.
[7] Statutes 1911 (extra session), chapter 27, p. 119.
[8] Statutes 1913, chapter 21, p. 25.
[9] Statutes 1915, chapter 68.
[10] Statutes 1915, chapter 50.
[11] Statutes 1915, chapter 156.
[12] Statutes 1915, chapter 632.
[13] Statutes 1915, chapter 1.

Imperial District Bonds.—A special act of 1915[1] validated an Imperial district bond issue of $3,500,000.00, dated January 1, 1915. This act was intended to assist Imperial district in its negotiations for the purchase of the property of the California Development Company.

Purchase of System by Imperial Irrigation District.—A special act of 1915[2] authorized Imperial irrigation district to condemn or purchase the system of the California Development Company in California and the stock of the Mexican corporation owning the portion of the system that lies in Mexico, and in this connection to exchange district bonds not exceeding in amount $3,000,000.00.

Constitutional Amendments.—The constitution of California has been amended six times since 1902 in the interest of irrigation districts, or in such manner as to affect irrigation districts, or a single district. Section 1¾ of Article XIII, as approved November 4, 1902, exempts irrigation district bonds from taxation within California. Section 13½ of Article XI, as approved November 6, 1906, permitted irrigation districts to make their bonds payable at any place within the United States designated in said bonds. This section was further amended November 3, 1914, to permit irrigation districts to make their bonds and the interest thereon payable "at any place or places within or outside of the United States, and in any money, domestic or foreign, designated in said bonds." Section 16½ of Article XI, as approved November 5, 1912, permits California irrigation district bonds to be deposited as security for state, county, or municipal funds.

Section 13 of Article XI, as approved November 3, 1914, permits the legislature to provide "for the supervision, regulation and conduct, in such manner as it may determine, of the affairs of irrigation districts * * *." Finally, section 31 of Article IV, as approved November 3, 1914, provides "that irrigation districts for the purpose of acquiring the control of any entire international water system necessary for its use and purposes, a part of which is situated in the United States and a part thereof in a foreign country, may, in the manner authorized by law, acquire the stock of any foreign corporation, which is the owner of, or which holds the title to, the part of such system situated in a foreign country,"—an amendment purely in the interest of Imperial irrigation district, and designed to permit it to acquire full control of the works of the California Development Company lying in Mexico.

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[1] Statutes 1915, chapter 17.
[2] Statutes 1915, chapter 172.

STATUS OF CALIFORNIA DISTRICTS JULY 1, 1915.[1]

Altogether fifty-seven irrigation districts have been organized in California since the passage of the Wright act in 1887, of which nine have been formed since the passage of the act of 1897. Counting eight of the old districts—Browns Valley, Modesto, Turlock, Alta, Tulare, Little Rock Creek, Big Rock Creek, and Walnut—seventeen out of the fifty-seven are in existence and twelve are operating. Of the remaining five, Big Rock Creek district has just been revived, Anderson-Cottonwood, La Mesa, Lemon Grove and Spring Valley, and Imperial, although fully organized and although they have all voted bonds, have not yet become operating districts, and Waterford and Alpaugh have not yet adopted plans or voted bonds.

In the following pages a somewhat detailed account is given of the status of the sixteen present active[2] districts, with emphasis laid rather on management than on works. That the people of the best California irrigation districts are developing a reasonable efficiency in handling their district business problems there can be no question; yet it is by no means certain that a higher efficiency would not result from a larger centralization of administrative authority. Only in the case of Imperial district has a high salaried general manager been employed, and even in that instance business questions seem largely to be retained within the jurisdiction of the directors. Further, this district is not yet fully operating. That it is proposed in Imperial district to have the directors retain a considerable administrative jurisdiction is evidenced by the passage in 1915, at the instance of Imperial district, of an amendment to the irrigation district law[3] by which directors in districts containing over 500,000 acres shall receive salaries of $150.00 per month in lieu of $4.00 per day received previously. In Modesto, Turlock, Oakdale, and South San Joaquin districts, as will be seen, the directors have been accustomed to devote much more time to district business than

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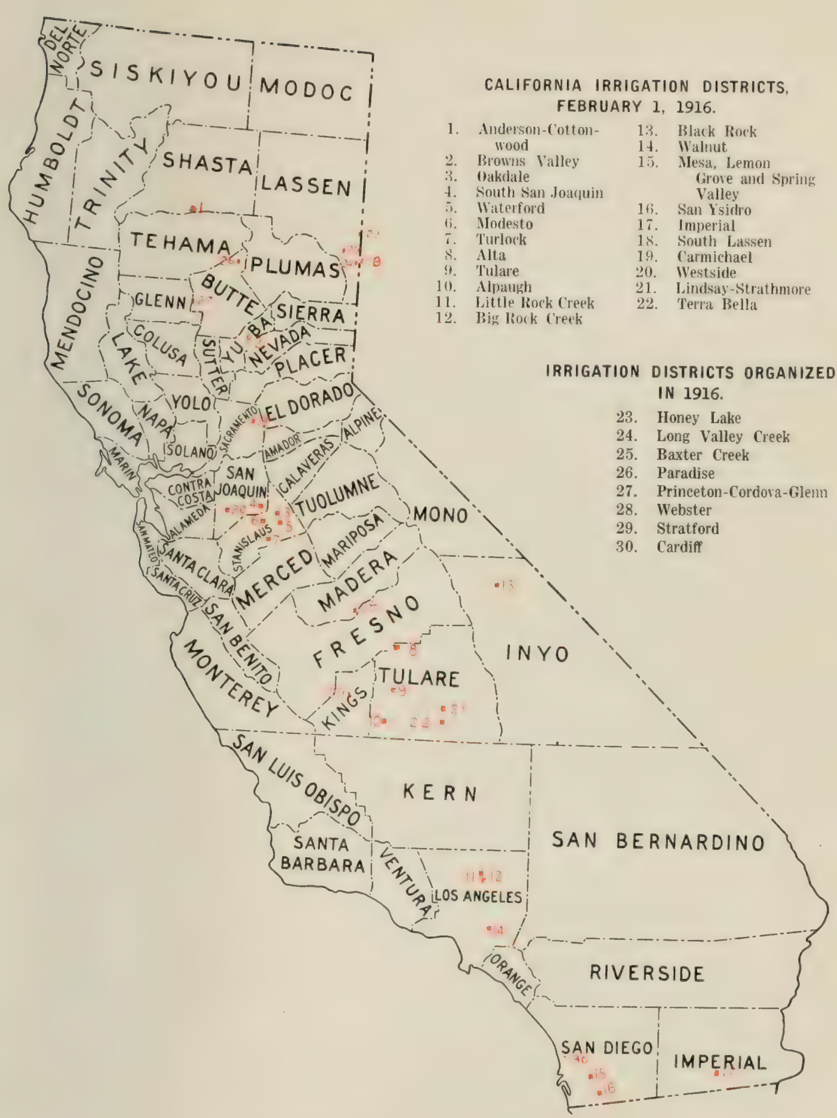
[1] Since this was written West Side, Terra Bella, Lindsay-Strathmore, Carmichael, and Southern Lassen irrigation districts have been formed, the latter without investigation and report by the State Engineer. The locations and areas of these four districts are as follows, according to records filed with the State Department of Engineering: West Side, near Tracy, area 11,700 acres; Terra Bella, surrounding Terra Bella, area 12,500 acres; Lindsay-Strathmore, east of Lindsay and Strathmore, area 15,775 acres; Carmichael, near Fair Oaks, area 3,113 acres; Southern Lassen, near Doyle, area approximately 30,000 acres. The formation of additional districts is, or recently has been, under consideration at Paradise, Thermalito, Oroville, Willows, Princeton, Ione, Morgan Hill, Merced, Madera, Stratton, and Cardiff, San Diego County. Since this was first printed the following additional districts have been formed: Cardiff, near San Diego, area about 700 acres; Honey Lake, near Amadee, area approximately 31,000 acres; Paradise, area 11,250 acres; Stratford, near Lemoore, area 9,200 acres; Webster, near Madera, 15,000 acres.

[2] The term "active" is used here to designate districts that are actually active in construction or operation; or that have been only recently organized and are now in the preliminary stages looking to real activity.

[3] Statutes 1915, chapter 696.

PLATE III.



CALIFORNIA IRRIGATION DISTRICTS, FEBRUARY 1, 1916.

1. Anderson-Cottonwood
2. Browns Valley
3. Oakdale
4. South San Joaquin
5. Waterford
6. Modesto
7. Turlock
8. Alta
9. Tulare
10. Alpaugh
11. Little Rock Creek
12. Big Rock Creek
13. Black Rock
14. Walnut
15. Mesa, Lemon Grove and Spring Valley
16. San Ysidro
17. Imperial
18. South Lassen
19. Carmichael
20. Westside
21. Lindsay-Strathmore
22. Terra Bella

IRRIGATION DISTRICTS ORGANIZED IN 1916.

23. Honey Lake
24. Long Valley Creek
25. Baxter Creek
26. Paradise
27. Princeton-Cordova-Glenn
28. Webster
29. Stratford
30. Cardiff

Sketch map of California, showing location of active or recently organized California irrigation districts, February 1, 1916.

boards of directors of most commercial and industrial enterprises devote to those enterprises. It would seem, however, that even in these districts sentiment will gradually crystallize in favor of giving more and more administrative authority to the principal operating officer, whether that officer be styled a general manager or an engineer and superintendent. The logical ultimate development would seem to be to an able and well-paid manager to whom all employees, from attorney to ditchtenders, shall report, and with whom the directors shall advise and to whom they shall look for that efficient business administration which most irrigation districts have in the past lacked.

California irrigation districts have not wanted for their full share of internal friction, yet the history of such districts as Modesto and Turlock shows that this is decreasing as the people become more accustomed to irrigation farming and more experienced in cooperation and local self-government. A fundamental of good irrigation district government is a consciousness on the part of the people of the district of a community interest and of individual community responsibility. In the more important of the successful California irrigation districts such consciousness has been quite well developed, but the efforts it has stimulated have not always been constructive. One of the problems of irrigation districts, therefore, is to stimulate a constructive rather than a merely scolding interest on the part of the irrigators.

The financial management of California irrigation districts has not been free from difficulties and under the earlier law, as has been shown, those difficulties were not always met squarely. From the refunding act of 1897 down to the amendments of 1915, however, California irrigation districts and those interested in them have been endeavoring, usually with sincerity, to simplify and make more businesslike irrigation district financial operations. The development of the changes in the financial provisions of the district law is shown under a former heading (p. 48), but in reading of the present status of the districts now active some attention to financial affairs, especially the levying and collection of district taxes, is believed to be worth while. No mention is made of the extent of delinquencies in the payment of district taxes, although that matter was inquired into. In the well established districts delinquencies are negligible and are much more than cared for by the extra levy permitted by the district law. In one or two of the newer districts and in the old districts recently reorganized delinquencies have been large enough to constitute a distinct annoyance if not a problem; yet there is no evidence that if a problem is involved, it will not be worked out satisfactorily, or even that it is of sufficient importance to jeopardize the success of the enterprise affected. In no case has one of the fully reorganized districts or one of the new and already established districts failed in meeting bond interest, or bond principal when due.

The law requires that property shall be assessed for district purposes at its full cash value. It is realized that assessments for both special and general taxes levied by counties and municipalities are bound to vary, no matter for what purpose they are levied. Therefore, it is not unexpected or surprising to find similar differences in the valuations placed on land of the same general character in irrigation districts. In irrigation districts, however, quite different methods in reaching valuations are followed, and it is to these methods that it has been deemed worth while to call attention in discussing conditions in the various districts now active.

Whenever the necessary data could be readily obtained operating expenses have been given and water delivery methods described quite fully. These are matters of every-day, practical interest to operating officials, which is the justification for including them.

ANDERSON-COTTONWOOD.

The historical data covering early operations under the Wright act already given disclosed the fact that of seven districts formed under that act in Sacramento Valley from 1887 to 1891, only Browns Valley district is now active, and with even that district only partially operating under the district law. It is, therefore, especially interesting that an important section of Sacramento Valley should now have turned to the district form of organization as a means of furnishing much needed irrigation water.

Anderson-Cottonwood irrigation district, extending along Sacramento River from Redding to below Cottonwood Creek, was organized July 14, 1914, by a vote of 512 to 17. While mostly lying west of the Sacramento, a narrow strip of land across the Sacramento connects the main portion of the district with about 3,800 acres east of the Sacramento on Churn Creek bottoms and Stillwater plains. The total area in the district, as voted, was approximately 32,500 acres, but several holdings have since been excluded and the exclusion of several others has been asked for and was under consideration by the directors in July, 1915. Generally speaking, the land embraced consists of first and second bottom river lands, first bench, and rolling plains. More technically, the lower lands are mostly classified by the bureau of soils[1] as Sacramento silt loam, Sacramento fine sandy loam, Anderson fine sandy loam, and Sacramento loam; the next higher mostly as Anderson gravelly loam; and the higher or plains areas chiefly as Redding loam and Redding gravelly loam. Although some of the plains land has been dry-farmed to grain and a little is still so farmed under summer-fallowing, agricultural production has mainly been confined to the two lower soils and to the largest extent to the bottoms. On the latter a considerable development in alfalfa and in deciduous fruits has occurred, with very little land irrigated. With water supplied as now proposed by the new district, and carefully used so as to avoid over-wetting of the lower areas, production should be very appreciably increased on the fruit, alfalfa, and grain lands now under crop, and some of the higher lands now chiefly of value only for grazing should be given a substantial value for irrigation farming. The depth and composition of the higher lands both vary, and some of these lands are not likely to be very productive, although some seem well suited to certain types of orchard culture which an irrigation supply will make possible.

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[1] United States Department of Agriculture, Bureau of Soils. Soil Survey of the Redding Area, California.

The irrigation system planned by Anderson-Cottonwood district, and on the basis of which bonds to the amount of $480,000.00[1] were carried June 18, 1915, by a vote of 503 to 94, calls for a main canal from Redding to the south side of Cottonwood Creek in northern Tehama County, a total distance approximating 30 miles. Water is to be diverted, during low water stages, by a concrete flash-board dam 500 feet long at the head of the old "Wheel" ditch shortly above Redding. From that point the main part of the system is to consist, in the order given, of a concrete-lined tunnel 2,480 feet long and 10 feet in diameter under a part of the town of Redding; an open channel 4,000 feet long to a weir near Sacramento River to be so constructed as to provide for winter drainage and the flushing of the canal above; a branch leading across the Sacramento, called "Churn Creek main," and involving a concrete and cast-iron siphon under the Sacramento; a main open canal from the above-mentioned weir to the crossing of Cottonwood Creek; a concrete siphon under Cottonwood Creek; and an open canal from there to the end. The Churn Creek main, according to the plans, is to have four principal laterals, and the main canal on the west side a total of twenty. A pumping plant to cost with laterals $46,290.00 is planned for lifting water from the Churn Creek branch 38 feet to the small area on Stillwater plains that lies in the district. Three other pumping plants, estimated to cost a total of $8,520.00, will be necessary to raise water not exceeding 20 feet to small areas in the district lying above the west side main. The duty of water figured by the engineer of the district is one cubic foot per second for each 100 acres irrigated and the main canal is designed to carry at its head at least 365 cubic feet per second. Pumping plants are designed to deliver three acre-feet per acre per season over the areas served by them and all laterals, except two to carry

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[1] The estimates of the engineers employed by the district called for an expenditure of $359,950, but the amount necessary was raised by the State Engineer to the amount voted.

50 cubic feet per second each, are designed for 32 cubic feet per second. The acre-cost of pumping has been estimated to be not to exceed $2.70 in the case of the plant on Churn Creek bottoms and not to exceed $2.05 in the case of the others. The estimated acre-cost for operation, including maintenance, interest, replacement, and distribution, is $1.20, counting on the full area of 32,500 acres within original boundaries.

It is, of course, not possible to forecast the success of Anderson-Cottonwood irrigation district any more than of any other undertaking of similar character. That the enterprise is justified there can, however, be no question. The engineering problems involved are admittedly not serious and the engineering plans adopted have, with some modification as to costs, been approved by the State Department of Engineering. Assuming that the slight opposition that has been voiced will not develop into obstruction, that the federal government will interpose no objection to the proposed diversion from Sacramento River, and that the bonds that have been voted can be economically disposed of and the proposed works completed, the enterprise will still have before it the problems always attending the changing of the agriculture of a community from a dry to an irrigation basis. Most of the land holdings are now too large to be farmed economically under irrigation, so that as a rule they must be cut up as soon as water is available and annual water charges levied. With few exceptions the present landowners are untrained either in irrigation practice or in irrigation farming, and their first task will be to learn to irrigate and to grow and dispose of the crops that are best adapted to the soils and the situations of the district, and that will be profitable. Some difficulties will be encountered in distributing irrigation water over uneven surfaces and restraint will be needed to prevent washing of the steeper lands and overwetting of the bottoms, especially where there are depressions. The large flow of Sacramento River at the proposed point of diversion will insure an ample water supply and this will so tend to encourage overuse that a strict system of measuring water to irrigators and of at least partially basing the annual water charge on the quantity used seems essential. At this writing a difficult administrative problem before the district is that of levying district assessments. The nonproductivity of the plains lands without irrigation and the local belief that these lands will undergo a greater relative increase in value under irrigation than the already productive bottoms has convinced the owners of the bottoms that they should not be taxed a greater amount for construction expenses than the owners of the plains lands. The 1914 county assessment of the plains lands was generally about $7.00 per acre, while that of the bottoms reached as high as $40.00. Under these conditions the important practical question before the assessor became: Is it possible, under the provision of the law requiring all lands to be assessed at their full cash value, to assess the plains and bottoms at the same figure? An equal assessment seems to have been agreed on by the landowners as being desirable, but a feasible adjustment of the matter had not yet been worked out when the district was visited in July, 1915.

BROWNS VALLEY.

The present status of this district is partially given in connection with its history. Browns Valley is not a "valley," strictly speaking, but rather a series of low rolling hills and valleys. The hills are higher and the valley depressions consequently more pronounced as the Sierra are approached on the east, while on the west the lands grade off to lower rolling plains. It is this unevenness in topography that limits the area in the district susceptible of gravity irrigation from the system. Except on the west, which is barren, the hills are covered with scrub oak and pine, with in some places a rather dense undergrowth of brush. The crops grown include a limited amount of alfalfa, small fruits, some deciduous and citrus fruits, and olives, and there is a considerable acreage of wild meadows, which, with the alfalfa, make dairying rather prominent. The original crib dam at the head of the canal has been replaced by a concrete structure and from there to the power house at Colgate the canal capacity has been increased, for power purposes, to about 700 cubic feet per second, the cost of this having been met by the power company with which the district has an agreement. From Colgate to the lower power house along Dry Creek the capacity is said to be about 50 to 70 cubic feet per second. In July, 1915, the power company reported to the district the carrying of 1,600 inches, or 40 cubic feet per second, about 40 miles above. The district has in all about 100 miles of main canals and laterals.

Having, under its agreement with the Pacific Gas and Electric Company, only to care for water delivery and maintenance of the laterals, the operating expenses of the district are not high. The amount due to the district under its contract with the Pacific Gas and Electric Company is uncertain, but is believed by some of the officers of the district not to exceed 1,800 or 2,000 inches. In 1915 about 1,200 inches is being received, all of which is used. Water is sold to the irrigators at the rate of $3.00 per miner's inch per season, measured under a 6-inch pressure at each point of delivery, 75 inches being about a maximum "head," and each irrigator running water continuously during the irrigation season, which in dry years may extend from March to November. During the winter season stock water is kept in the ditches. No record is kept of the amount of land irrigated, nor is the exact duty of water under the system known. From such general observations as were made it was concluded that the area receiving water in 1915 does not exceed 2,500 acres. A feeling is growing in the district that a more careful use of water and a rotation system of delivery must be put into effect in order to care for the increasing demand for water. About one-half of the land in the district is estimated by the president of the district to be held by owners who are now using no water; and even the owners who are irrigating are applying water to only about one-tenth of their holdings. As under the district law all have equal rights to the water controlled by the district, an additional supply must be obtained as more desire to irrigate, or the district must attempt the impossible task of making under 2,000 inches of water meet the needs of the irrigable portions of nearly 45,000 acres of land. At present there are 104 irrigators, of which five or six use as little water as one miner's inch.

The organization of Browns Valley district consists of a board of three directors elected at large, an assessor-collector, and two ditchtenders, one of the directors also acting as secretary, but receiving no compensation other than the $4.00 per diem allowed directors for each meeting of the board. The salary of the assessor-collector is $30.00 per annum. One of the ditchtenders acts as superintendent and receives $90.00 per month, with a reduced rate during the winter; the other ditchtender receiving $75.00 per month during the running of water. Neither ditchtender is furnished transportation by the district. The plan of not levying any assessments is still followed, all expenses being met by the water tolls. The directors of Browns Valley district, as in most other cases, are not entirely free from local troubles in the management of the district's business and the distribution of its water supply. There have recently been two small cases of litigation, one seeking to enjoin a water user from taking water without permission, and the other involving damages alleged to have been suffered to crops through failure by the district to deliver water. Both suits were decided wholly in favor of the district. A few have failed to pay water tolls and suits to collect are contemplated. On the whole, however, the affairs of the district run smoothly and an agriculture more satisfactory than that of earlier years, with its foundation in dairying and stock raising, is gradually developing.

SOUTH SAN JOAQUIN.

Thirty years ago agricultural conditions had reached that stage in certain portions of the northern part of San Joaquin Valley that further substantial progress was impossible without irrigation, even if there should not be a backward movement if nothing were done to change matters. The critical stage had been reached in the balance between profits from farming with water and without it. In the areas centering around Modesto there was no doubt that farms must either grow larger and be more extensively worked, or grow smaller and be farmed under the intensive culture water would make possible. It was out of these

PLATE IV.

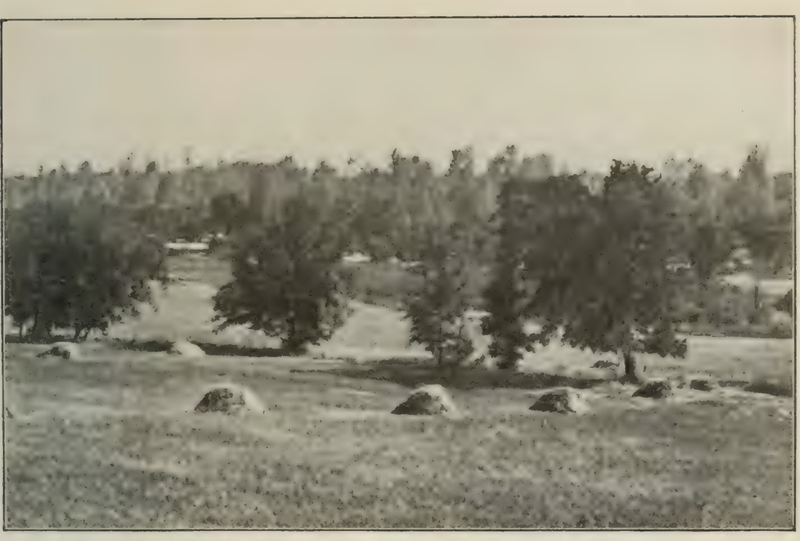

Fig. 1.—Irrigated Rolling Meadow in Browns Valley Irrigation District.

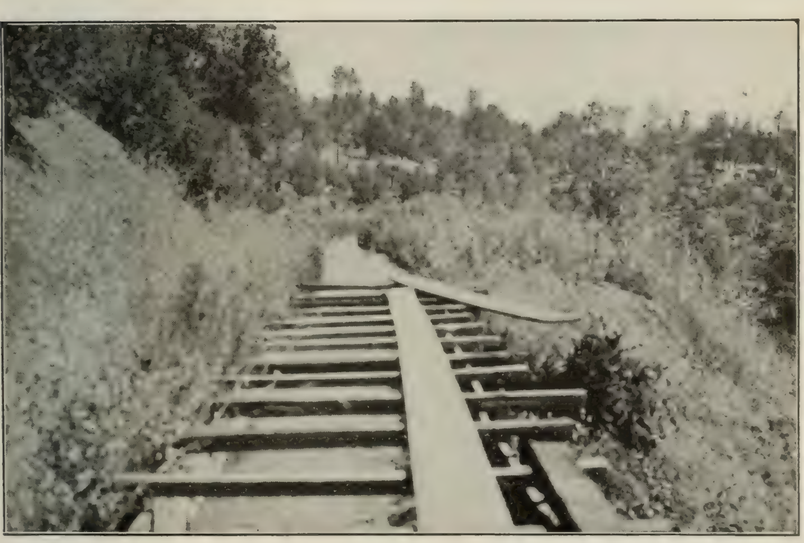

Fig. 2.—Main Supply Ditch of Browns Valley Irrigation District.

conditions, as has previously been stated, that the Wright act of 1887 grew, and that this act was suited to these conditions, even if the act itself was incomplete, has been proven by the success of the two large districts formed at Modesto and Turlock. It was therefore not unnatural that the neighboring communities about Oakdale, Ripon, Manteca and Escalon should also eventually come to the district form of organization for irrigation development.

South San Joaquin irrigation district, lying wholly in San Joaquin County, was organized May 11, 1909, by a vote of 376 to 87. Previous efforts to obtain water date back to about 1889, when the San Joaquin Land and Water Company was formed to divert water from Stanislaus River.[1] After passing through many difficulties and later reorganization into the Stanislaus and San Joaquin Water Company, and again after passing into the hands of the South San Joaquin Canal and Irrigation Company and the Consolidated Stanislaus Water and Power Company, this enterprise that had been started in 1889 passed into the hands of a receiver and was sold at auction for a small fraction of the amount of money that had been invested in it, and by 1908 it was delivering water to several thousand acres. At that time, however, it was apparent that the old system must be enlarged and reconstructed and its owners, known as the Tulloch interests, began a canvass for the sale of additional water rights at $20.00 per acre. Like many water-right contracts, the contract offered to the farmers by the Tulloch system was not looked upon favorably, and the feeling gradually developed that if the farmers were to pay for building a new system they should own that system themselves. Meetings to discuss the situation were held at Manteca, Ripon, and elsewhere, and out of these meetings an irrigation bureau was formed by representative landowners in southern San Joaquin County for the avowed purpose of promoting the formation of an irrigation district. This irrigation bureau went about its work very effectively. Several hundred dollars was subscribed by the members and a newspaper, known as the "Irrigation Bulletin," was started to further the campaign. For about a year this publication, largely supported by its advertising pages, kept the matter of the proposed irrigation district constantly before the landowners in the area affected and the commercial and financial interests of the city of Stockton, and it was under the direction of the irrigation bureau that the lines of South San Joaquin irrigation district were laid out and organization of the district finally consummated.

From the beginning South San Joaquin irrigation district seems to have been fortunate in the selection of its officers, for, in spite of some mistakes that are acknowledged, it is doubtful if more efficiency and force have been put into the organization of any other irrigation district in the state, nor has any district been more loyally supported by the landowners. As soon as the district was organized an experienced and competent engineer was employed to lay out the proposed system, and on May 12, 1910, after a very thorough engineering study, an assessment of $35,000.00 was levied by a vote of 292 to 70, to pay for engineering expenses. The first bond issue, amounting to $1,875,000.00, and dated July 1, 1910, was authorized by a vote of 329 to 67. Of this issue $325,000.00 in bonds was used for the purchase of one-half interest in the old Tulloch system, and contracts were let jointly with Oakdale irrigation district for the construction of a diverting dam in Stanislaus River, and also, independently, for the construction of the canal system to the district. Through inability of the district to dispose of its bonds in the open market and the consequent necessity for letting its contracts only to those who would agree to buy sufficient of the bonds to pay for these contracts, the original bond issue proved only sufficient for constructing the works down to the district line, so that a further issue became necessary if the district was to construct the distribution system within the district. Accordingly, an election was held January 25, 1913, at which were submitted two propositions: One for the issuance of bonds amounting to $1,170,000.00 for construction and completion of the main distributory canal within the district and for laterals and drainage ditches, the distribution system to extend to each 40-acre tract within the district; the other for the issuance of bonds amounting to $790,000.00 for the construction of a foothill reservoir and other storage facilities. There was much discussion in the district prior to this bond election as to the desirability of completing the distributing system of the district to each 40-acre tract, which was something no other irrigation district in the state had done. The proposition to do this was, however, submitted and carried by a vote of 492 to 24, the proposal to issue bonds for reservoir construction carrying by 432 to 83.

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[1] Previous to this, however, and as early as about 1864, the property taken over by the San Joaquin Land and Water Company, or a portion of it, was owned by the San Joaquin County Water Company, but divested of title by foreclosure, after which the property came into the hands of one Abraham Schell.

After the early difficulty experienced by the district in disposing of its bonds except through contractors, the estimates of the engineer of the district covering construction of the distribution system and of the proposed storage were based on selling the bonds at a figure considerably below par. There was still some difficulty, however, in obtaining contracts within the estimates, and it was necessary to levy a special assessment of $140,000.00 in 1914 to complete the work. So determined were the people of the district that the system should be completed as planned, that when the matter was laid tentatively before them, they not only consented to this assessment, but pledged themselves to the amount of over $20,000.00 pending the calling of the special election, in order that the construction work should go on without delay. Rights

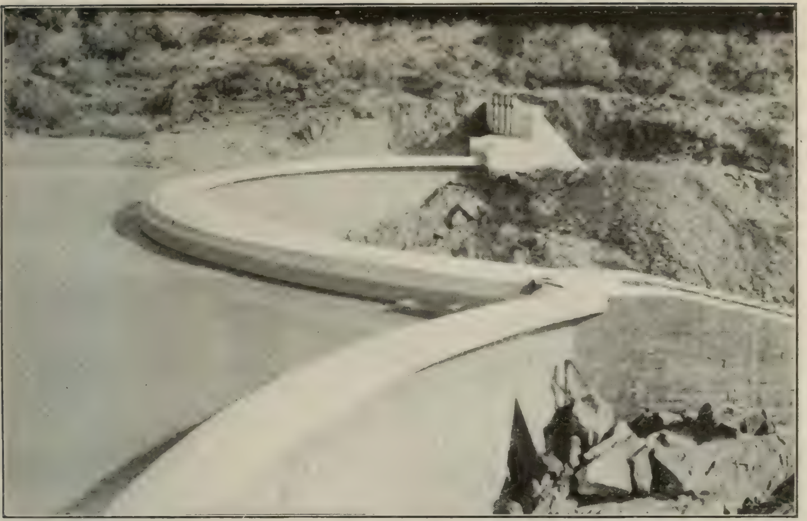


Fig. 1.—Goodwin Dam of Oakdale and South San Joaquin Irrigation Districts at low water stage.

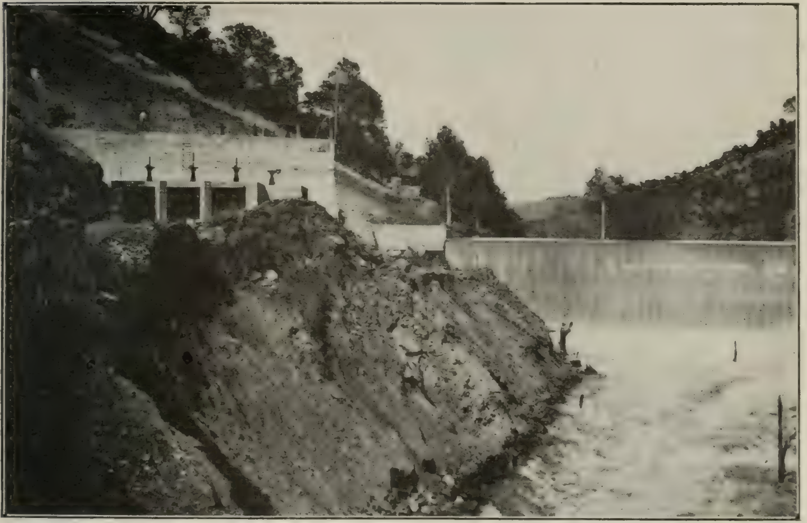
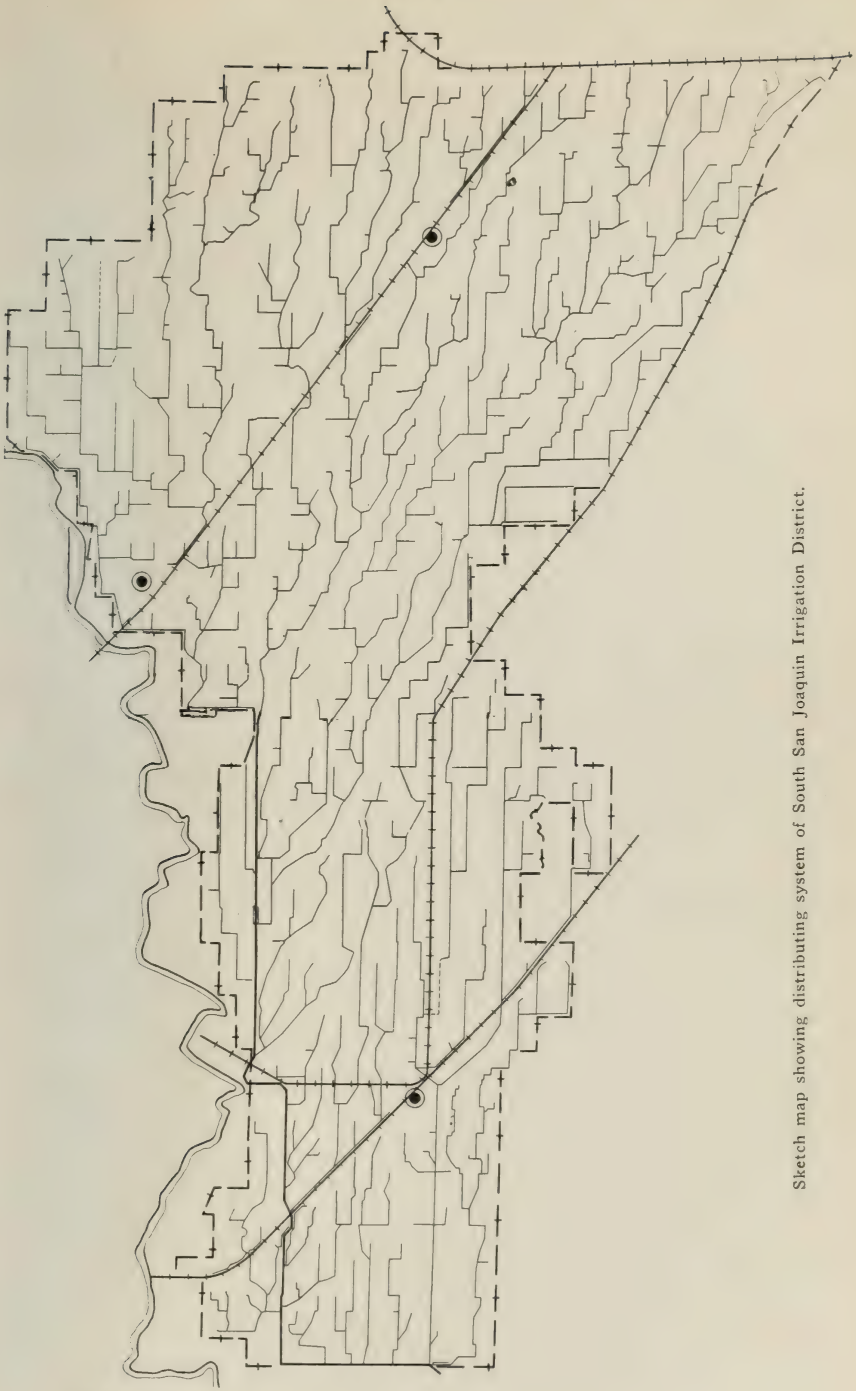


Fig. 2.—Headworks of South San Joaquin Irrigation District Canal and portion of Goodwin Dam.

PLATE VI.



Sketch map showing distributing system of South San Joaquin Irrigation District.

Bul. 2—(plate v)

of way were given without cost to the district for all laterals within the district and the distribution system was carried to completion by the early summer of 1914, when the delivery of water began, the upper works having been formally opened April 6th of the previous year.[1]

Although bonds for reservoir construction were voted by South San Joaquin district in 1913, only a small portion of these have thus far been used. Land in the proposed foothill reservoir site has been purchased at a cost of about $87,000.00 and the matter of going ahead with construction is now under consideration. The estimates for completing the distributing system for which $1,170,000.00 was voted along with the reservoir issue included an item of about $85,000.00 for drainage, but this has not yet been constructed. Certain portions of the district are in need of drainage but a complete plan of drainage has not yet been worked out or adopted. The first step contemplated is the construction of an intersecting ditch line along the western boundary of the district to receive waste from the lateral system and also to carry away surplus ground waters in that section.

Counting the three bond issues thus far authorized the total indebtedness in South San Joaquin district is $54.75 per acre, which is the highest cost of any of the California irrigation districts. It must be borne in mind, however, that this cost includes a distributing system to each 40 acres of land within the district (Plate VI), and also a substantial appropriation for storage. It yet remains to be seen whether the complete construction of the distribution system will work out to the advantage of the district, although no one has seriously questioned the judgment of the directors and the people of the district in incurring this expense in advance of closer settlement. Three principal considerations actuated the construction of the distribution system, namely: The probable reduced cost to the community if the laterals should be constructed at one time under a single distribution; the saving in cost of rights of way, these all having been granted free to the district; and the desirability of making water immediately available to each subdivision in the district to the end that settlement might be rapid. It has been the history of the neighboring districts that development of considerable areas has been held back by distance to the main distribution system. While this condition is not of great importance where the acre cost of the irrigation system is low, the question of making water available to each tract at once is a matter of much importance where the cost per acre is as high as in South San Joaquin district. Unfortunately, South San Joaquin irrigation district is most in need of settlers in the period of western development when settlers are scarce.

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[1] For description of South San Joaquin irrigation district, including works, soils, and finances, *see* report of Irrigation District Bond Commission of California, dated May 13 and September 17, 1913, published by the district.

A considerable proportion of the district has been laid out in subdivisions, but these have not yet in large measure been sold. Nevertheless, there are relatively few large holdings in the district, and due to the general rise of ground water and the resulting subirrigation of some of the land, much of the district that is not yet surface irrigated is successfully growing such annual crops as sunflowers, sorghums, sugar beets, and melons, and all of these are returning a higher profit than the former dry-grain farming. Thus the growth of these crops on subirrigated land has changed a condition which might have been considered a serious one to one which is generally considered entirely hopeful. During the season of 1914 application was made to the district for water for 15,600 acres. Preliminary figures available in September, 1915, indicate that approximately 22,000 acres has been irrigated during this season, of which 10,928 acres is in alfalfa, 1,123 acres in trees, 3,136 acres in vines, 1,547 acres in sunflowers, 1,322 acres in beans, 2,909 acres in corn, and 1,224 acres in truck.

Of the 70,050 acres in the district, nearly all was under cultivation when the district was formed, and only 250 acres was classed as untillable. The estimated population of the district in 1915 is 3,500 and the total 1915 valuation assessed for district purposes is $5,478,594.30. The amounts raised annually by assessment have increased from $67,129.69 in 1910 to $372,531.95 in 1914. The irrigation district tax rate per $100.00 valuation has increased from $2.35 in 1910 to $4.85 in 1915. With the exception of between 3,000 and 4,000 acres situated too high to receive water from the system by gravity, which is assessed at $15.00 per acre, the district valuations range from $105.00 down to $80.00 per acre. A zone system, with the towns of Manteca, Ripon, and Escalon as centers, is followed in arriving at valuations. Town lands are valued somewhat arbitrarily, but in general at about one-third of their market value, acreage property within the towns being assessed at $105.00 per acre. In arranging the zones, four squares are described around the towns at distances of one-fourth mile, one-fourth mile, one-half mile, and one-half mile, respectively, from the outside limits of the towns, and the valuations within these four zones range from $100.00 down to $85.00 per acre. All land outside of the last zone and in excess of one and one-half miles from the town limits is valued at $80.00 per acre. While the cost of water in South San Joaquin district is high as compared with other irrigation districts in the state, it is not greater than under some of the other projects, and the general fertility of the soil of the district and the proximity to several main lines of transportation would seem to make the annual charge a somewhat less burden than the same charge would be in a less favorably situated section.

The directors of South San Joaquin district follow the practice of devoting much attention to the management of the district business, each member of the board having served an average of seventeen days per month during the past six months. While this excessive amount of time is partly due to the fact that some of the members have but recently been elected, nevertheless it seems to be the policy of the board to devote much time to details, rather than to leave these details to the trained engineer employed.

OAKDALE.

The area watered by the old Tulloch system mentioned above in connection with South San Joaquin irrigation district included land around Oakdale, and when South San Joaquin district was successfully organized the people about Oakdale concluded that if nothing were done by them to increase their irrigated area they would be in danger of losing to the South San Joaquin sections water rights still available in Stanislaus River. Thus stimulated, the community was not long in organizing, and within six months from the time the matter was first given publicity, namely, on October 23, 1909, the organization of the Oakdale district was authorized by a vote of 348 to 27. Within a short time thereafter engineers were in the field and a system was laid out calling for the expenditure of $1,600,000.00. A contract was then entered into with the Tulloch interests to purchase those interests for $650,000.00 in bonds, with an agreement that South San Joaquin district should participate in the contract on equal terms with Oakdale. The bond issue of $1,600,000.00 recommended by the engineers was approved by the electors on February 26, 1910, by a vote of 339 to 9. In conjunction with South San Joaquin district the contract with the Tulloch interests was then closed, each district paying $325,000.00 in bonds for a one-half interest in the system, including water rights. The plan of works decided upon was soon adopted, but for nearly two years the district failed to dispose of its bonds, although one bid was accepted and a contract let for a portion of the work, both of which it was later found necessary to cancel. On January 4, 1912, however, contracts were let for the construction of the system, arrangements having been made by the contractors to purchase the bonds of the district at par, as needed. Oakdale district experienced the same difficulty that was experienced in South San Joaquin district in building its works within the estimates of the engineers, on account of the extra price needed to be paid for work under conditions that required the contractors to find purchasers for the bonds. Because of this and other reasons, additional bond issues became necessary, and $400,000.00 were authorized by a vote of 322 to 40 on December 27, 1912, and an additional $400,000.00 by vote of 492 to 129 on October 5, 1914. Construction work under the last issue is now under way and chiefly consists of extensions to laterals, structures, concrete lining, the elimination of a bad section of canal by the construction of a tunnel estimated to cost $50,000.00, pipes and siphons, and culverts and bridges. The last bond issue of $400,000.00, which bears 6 per cent interest, was disposed of for cash at 90.25, the bidder agreeing to supply the money at stated intervals. The work under all of the bond issues was approved by the state bonding commission, and it is expected that the physical properties of the district will be in excellent shape after the completion of the works now under way. No bonds, however, have yet been voted for storage, nor have definite storage plans yet been adopted. Filings have been made jointly with South San Joaquin irrigation district and the Utica Mining Company for a reservoir at Spicer Meadows in the mountains above Oakdale. There have also been some negotiations regarding storage between Oakdale and South San Joaquin districts and the San Francisco and Sierra Power Company, which also has power interests on the Stanislaus.[1]

Including land irrigated under contracts taken over from the Tulloch system, Oakdale irrigation district irrigated a total of 11,217 acres in 1914, of which 5,017 acres was in alfalfa, 538 acres in garden, 1,109 acres in trees, 77 acres in berries, 132 acres in vines, 25 acres in beets, 1,698 acres in beans, 27 acres in melons, 1,882 acres in corn, 512 acres of new land being flooded for leveling, and 200 acres in rice. No definite unit has been fixed upon to which district laterals will be constructed, but the main and subsidiary laterals of the district are being extended to bring water within relatively easy access to landowners. The total area embraced in Oakdale district is 74,146 acres.

According to the assessment roll of 1914, there were in the district in that year forty-five holdings of 400 acres or over, and nine holdings exceeding 1,000 acres. On the other hand, there were many small units—112 of five acres each, 158 of ten acres each, 127 of twenty acres each, 45 of thirty acres each, 56 of forty acres each, and 22 of fifty acres each. Approximately forty-five subdivisions have been laid out in which the prevailing unit is forty acres, but these have not yet been largely sold. The largest development thus far is in what are locally known as the bench lands lying between Oakdale and the eastern boundary of Modesto irrigation district. East and southeast of Oakdale the lands are more rolling in character, the district having quite irregular boundaries in order to take in the flat lands among the hills. On the north side of Stanislaus River east of Oakdale, and also in the neighborhood of Oakdale, there was a considerable development in fruit growing, chiefly including citrus fruits and almonds, prior to the formation of the district. In the bottom lands in the immediate vicinity of Oakdale, vegetable growing has been very successful. Water was first delivered through the new works of the district in 1914.

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[1] For a general description of Oakdale irrigation district, including soils, works, financial conditions, etc., *see* report on Oakdale irrigation district by the State Irrigation District Bond Commission, dated June 25, 1914, and published by the California State Printing Office.

Valuations assessed for district purposes by Oakdale district have increased from $2,160,355.00 in 1910, to $3,342,140.00 in 1914. The district tax rate in 1910 was $2.62 on each $100.00 of valuation, and it has recently been fixed at $5.80 for 1915. Owing to the irregular character of the lands in Oakdale district, it was found impracticable to apply a zone system in making valuations. Acreage property in the town of Oakdale is assessed at $110.00 per acre; river bottom lands at $90.00 per acre; acreage property in towns other than Oakdale at $50.00 to $70.00 per acre; farm lands immediately surrounding Oakdale at $90.00 per acre; lands in the Orange Blossom citrus section at $60.00 per acre; the bench farming lands next below the rolling plains at about $60.00 per acre; and the rolling plains lands generally at $45.00 per acre. Some nonagricultural land along the river beds is assessed nominally and land above the ditch too high to receive water by gravity at $10.00 per acre.

The organization of Oakdale irrigation district has already had an appreciable effect in increasing population, in spite of the fact that as in South San Joaquin irrigation district and nearly all other irrigation projects in the west, settlement has been very slow during the past two years. The estimated population at the time the district was organized was 2,000, but this is now considered by the district assessors to have increased to 6,000. The first assessment roll of the district in 1910 had 703 assessment payers, but this had increased to 1,505 in 1915. As in the case of South San Joaquin district, Oakdale district receives some water well into the fall, due to the operation of power companies above Oakdale. While this supply will not be large until storage is provided by the districts, it is now sufficient to give late water to the crops most in need of it.

Internal affairs have not always run smoothly in Oakdale district, although there have been no greater internal difficulties than in most other new projects. When the third bond issue was found necessary, there was some dissatisfaction among certain of the people and an unsuccessful effort was made to recall the entire board of directors. Although they have employed a competent and experienced chief engineer and general manager, the members of the board of directors in some cases still devote a considerable amount of time to the details of district management, a majority of the members spending about ten days per month each on the district business, and one usually spending from twenty to twenty-five days per month. The board keeps a standing field committee of three members, one of whom is changed each month.

WATERFORD.

Approximately 13,000 acres are included in this district, which adjoins Modesto irrigation district on the west, and Oakdale irrigation district on the north. The lands embraced are generally those lying between Dry Creek and Tuolumne River, and extending from the western boundary of Modesto district eastward to the Modesto irrigation district reservoir at Dallas Lake. Some of the bottom lands along Tuolumne River east of Dallas Lake, and some of the bench lands lying directly north of them, are also included.

Waterford district was organized by a vote of 70 to 1 on September 6, 1913, and steps were immediately taken to make necessary surveys and to outline a system of works. Both Tuolumne and Stanislaus rivers were considered as sources and the former determined upon. It was realized, however, that on account of prior appropriations on the river by Modesto and Turlock irrigation districts, and by the city of San Francisco for a municipal supply, as well as by power companies, the chief dependence must be placed on storage. This it proposes to acquire through cooperation with Modesto and Turlock districts in the construction of the contemplated reservoir in Tuolumne River about six miles above La Grange dam. Water is now available to Waterford district without storage during the flood periods of the late spring and early summer, and the district is now seeking to acquire a right to divert water through Modesto canal by enlarging that canal down to the Waterford district lands. [1]At one time it was proposed to petition Modesto irrigation district for the inclusion in that district of all the land of the Waterford district, but this plan has been abandoned. The best method of combining the works of the two districts and the proper cost to be borne by Waterford district have been under discussion for some months, but in order to reach a conclusion most easily, it is now proposed for Waterford district to bring suit for condemnation of a right of way through Modesto canal, as permitted by an amendment to the Code of Civil Procedure passed at the last session of the California legislature.[2] In connection with this condemnation suit is is proposed to ask the State Railroad Commission to fix the price to be paid by Waterford district.

Land included in Waterford district is very similar to that in Oakdale district, and is really a continuation of it. For years the area included was a very satisfactory grain producing section, and most of the land in the district is now dry-cultivated for that crop. There are about 150 assessment payers in the district, about 6,000 acres out of the total 13,000 acres included, however, being the property of one individual. Final estimates of cost have not been made, but it is hoped to bring the cost per acre within $30.00, exclusive of reservoir construction. If there is no delay in the proceedings now under way, it is expected that some water will be available through Modesto canal during the high water period of 1916.

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[1] This right has since been acquired at a cost of $254,000.00, which includes both an interest in La Grange Dam and an interest in the enlarged works necessary.

[2] Statutes 1915, chapter 429. Among other things, this chapter amends section 1240 of the Code of Civil Procedure by providing that property appropriated to one public use by any irrigation district may be taken by another irrigation district for another public use for a purpose not inconsistent with existing purposes and use, this to include the right to enlarge, change, or improve the property to be taken.

MODESTO.[1]

As detailed in the history of Modesto irrigation district, previously given, irrigation water first became available for general use in this district in the early spring of 1904. During that year Modesto canal carried a mean flow of 167 and a maximum flow of 278 cubic feet per second and supplied water to 6,895 acres. The maximum diversion during the season of 1915 has been 730 cubic feet per second and, according to estimates supplied to the superintendent of the district at the beginning of the irrigation season of 1915, the total area for which water applications were filed with the district for the season of 1915 was 51,915 acres.[2] In 1904 the number of assessment payers in the district was 1,053, the assessed valuation was $4,342,125.00, and the total irrigation district tax was $112,895.25. In 1914 the number of assessment payers had increased to 2,912, the assessed valuation to $6,961,245.00, and the total tax, which was even larger in 1911 and 1913, to $174,031.13. The bonded indebtedness of the district in 1904 was $1,388,511.00, or $17.10 for each of the 81,143 acres in the district. On December 31, 1914, the outstanding bonded indebtedness was $1,605,823.75, to which has since been added the fifth and sixth issues, dated July 1, 1914, amounting to $610,000.00, making a total of $2,215,823.75, or an average of $27.30 per acre. With the exception of the years 1907, 1911, and 1913, when extra large special assessments were levied for improvements, this increase has been accomplished with no addition to, and sometimes with even a slight reduction of, the irrigation district tax rate. During these eleven years the minimum tax rate has been $2.30 and the maximum $3.75 per $100.00 of assessed valuation. For the past ten years the special assessments for betterments have ranged from $25,000.00 to $75,000.00 per annum, and have averaged about $40,000.00.

The succeeding account of the present status of Turlock irrigation district tells something of the difficulties that have arisen in the adjustment of the farmers of that district to the practice of irrigation. Conditions in Modesto district have been very similar, and the result in

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[1] For additional data on the present status of Modesto irrigation district, see report on this district by the Irrigation District Bond Commission of California, dated June 25, 1914. California State Printing Office, 1914.

[2] This area was distributed among the following crops: Alfalfa, 41,663 acres; trees, 2,867 acres; vines, 1,515 acres; beans, 1,815 acres; corn, 843 acres; grain, 3,076 acres; garden, 136 acres.

Modesto district, as in Turlock district, has finally been a better and broader outlook on the part of the farmers, and a definite tendency toward improved standards of management. How to improve and enlarge the district works, the amount of storage needed, and how best to get it, the proper division of the district into electoral divisions in order to minimize what some considered undue control by the voters in the city of Modesto, methods and efficiency of water distribution, who should be the engineer and superintendent and what should be his authority, and the attitude the district should assume toward diversions from the Tuolumne River watershed by the city of San Francisco, have been among the problems that have caused controversy. Regardless of whether these matters have been rightly or wrongly settled, the district has made, and is making, a definite and commendable advance, and is now engaged in a type of permanent betterments that must stand as a credit to the community.

In 1904 there were 8,932 lineal feet of wooden flumes and thirteen large wooden structures on the main Modesto canal. When work now under way is completed all of the wooden flumes and most of the drops will have been eliminated and permanent construction substituted. This permanent construction, which began in 1904, and has been continued as means would permit each year since then, has also included, among other improvements, the rebuilding of part of the headgate at La Grange dam, a large amount of concrete lining near the upper works, hydraulic fills with concrete-lined channels at the upper and lower Dominici and the Morton gulch crossings, the construction of Dallas and Warner foothill reservoirs, at a cost to date of approximately $260,000.00, enlargement of a portion of the main canal above the reservoirs to a carrying capacity of 2,000 cubic feet per second, and a beginning on a drainage system in the district. Work now under way, which is being paid for from the proceeds of the fifth and sixth bond issues, bearing 6 per cent interest, of which $25,000.00 was sold at par to the state and $585,000.00 sold for cash through a bond broker at 90.6, includes construction of hydraulic fills with concrete-lined channels at Indian Hill, Gasburg, Rairdan, and Salter gulch crossings, a reinforced concrete flume and spillway at the Dry Creek crossing, completion of the reconstruction of the headgate at La Grange dam, and the construction of a concrete cut-off wall at the inner toe of the outlet dam at Dallas reservoir and the facing with concrete of dams Nos. 1 and 6 at the same reservoir. When this work is completed it is proposed to spend an additional $35,000.00 in adding to the main open drain system in the district, to line three or four miles of the main canal at dangerous points, to give the main canal a capacity of 2,000 cubic feet per second from La Grange dam to the reservoirs and a capacity of 1,200 cubic feet per second

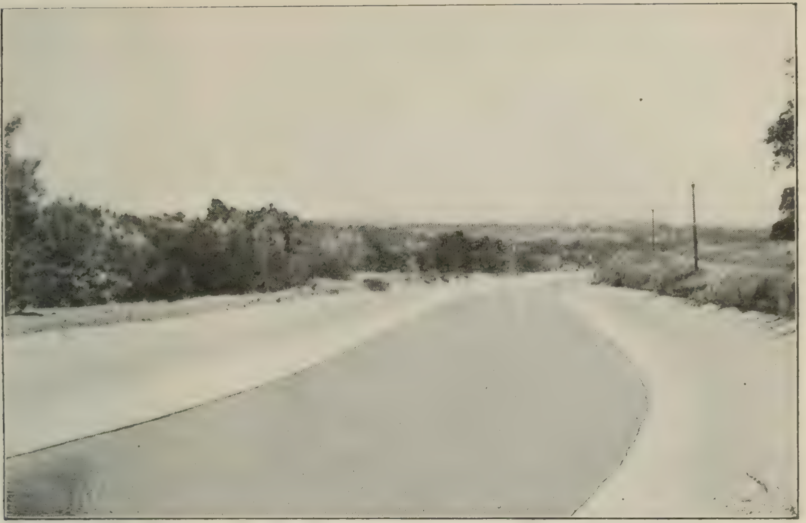

Fig. 1.—Concrete-lined portion of Modesto Canal in foothills below La Grange.

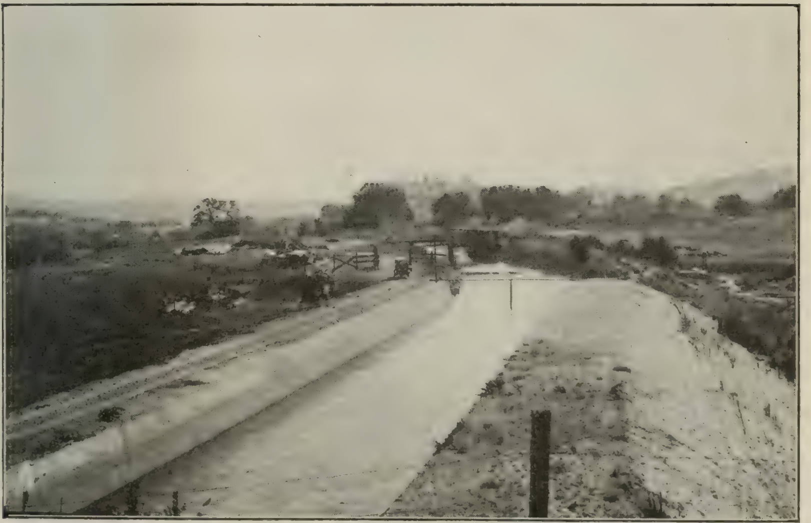

Fig 2.—Hydraulic fill with concrete-lined channel, Modesto Canal.

between the reservoirs and the district line, to build about fifty principal concrete headgates and checks within the district, to replace the four remaining wooden drops in the main canal with permanent concrete structures, and to build permanent wasteways at Waterford and at the lower Dominici fill. The engineer's estimate is that for the completion of the above work about $250,000.00 will be necessary in addition to the $610,000.00 in bonds comprising the fifth and sixth issues. There will then be left to build such additional drainage works as are found to be necessary and such additional reservoirs as it is decided to construct. Plans are now tentatively under way for the construction of a reservoir in the bed of Tuolumne River about six miles above La Grange dam in conjunction with Turlock district. It has recently been proposed to make an endeavor to get federal aid in the construction of this reservoir, it being claimed by the districts that, after having built up their communities entirely through their own efforts, they are now as much entitled to federal aid in reservoir construction as are different reclamation projects in which a very large proportion of the land benefited was in private ownership prior to government construction.

In common with other California irrigation districts, Modesto district has developed its own peculiar plan of levying district assessments. Improvements were exempted from district assessment on June 3, 1911, by vote of 487 to 403. Prior to that time a considerable portion of the total taxes raised came from improvements. Under present conditions the district assessor, in general, raises both farm and city property within the district about 50 per cent above the assessment for county purposes, except that the maximum appraisal per acre for farm land in the district is $90.00, this being the base for appraisal within one mile of the city of Modesto. Around the towns of Salida and Empire the base for appraisal purposes is $85.00. From these two bases of $90.00 and $85.00 assessments grade down to about 50 per cent above the county valuation. Vacant farming lands within the city of Modesto which are held for subdivisional purposes are appraised at from $150.00 to $200.00 per acre. An innovation in the assessment of business lands within the city of Modesto is the addition of about 25 per cent and possibly a little more on such property over the appraisal of town residence property. The question of reducing the assessment on lands too far from the district canals to be served with water has never arisen in Modesto district because the district does not build the distributing laterals other than the main laterals. In some cases, however, the district has taken over private laterals built by others on condition that the irrigators served sign agreements to abide by the rules of the district. For this it has been necessary to employ additional ditchtenders who serve from three to ten days per run at a daily wage of $2.50. In this connection it might be added that the district is drifting toward the plan of complete district control and supervision of distribution, regardless of lateral owners.

The distribution of water in Modesto district is now under the control of a superintendent and sixteen ditchtenders, the latter receiving $70.00 to $80.00 per month with neither house nor means of conveyance furnished. On the main canal ditchtenders are employed the year around, the others being employed during the irrigation season only, although they are used a portion of the nonirrigating season in general canal maintenance.

The usual irrigating head delivered in Modesto district is 20 cubic feet per second. When the district first started irrigation, methods of preparing land were exceedingly crude, the contour method with high and irregular levees being the most common practice. At present a majority of the irrigators use ''gravity'' or strip checks from 50 to 150 feet wide and up to one-fourth mile long, with the best practice confined to checks less than 75 feet wide and not over one-eighth mile long.

The directors of Modesto district still devote a good deal of their time to its management, holding regular meetings during construction periods about once per week, with committees of two or three directors devoting about an average of one day per week, in addition, to general supervision. At present the construction and operating forces are entirely separate.

The amendment to the irrigation district act permitting the recall of elective officers in irrigation districts was passed at the instance of people living in Modesto district and recall elections have been resorted to on three occasions, in two of which they were successful. As indicating a more stable feature of the management of this district, however, the interesting fact is worth noting that the very efficient secretary of the district has been kept steadfastly and continuously at his post for the last twenty-four years.

The matter of redivisioning Modesto district in order to place the city of Modesto in a division entirely separated from the divisions embracing the farm lands at one time aroused considerable discussion and was finally carried out. The idea prompting the change was that if embraced within a single electoral division, the voters in Modesto would not be able to control the board of directors as some had charged they had been able to do when the city extended into several of the divisions. The main argument advanced against the redivision was that about one-half of the population of the district resides within the city, and that having its representation upon the board of directors reduced to one out of five, the city population would be unfairly treated.

TURLOCK.[1]

Turlock irrigation district, since its financial reorganization in 1902, and Modesto district, directly across Tuolumne River, since the refunding of its indebtedness, have furnished the most interesting phases of the history of irrigation district operation in California under the amended law of 1897. In no other districts in the state have the provisions of the law been so fully taken advantage of, and in no other districts have the people experienced so fully the personal and social readjustments necessary in a municipal enterprise of the magnitude of these two districts. The latter statement is made with due realization of the fact that internal controversies have occurred even within the past year, and that they are sure to occur in the future, yet in the belief that the net gain in the ability of the communities to deal successfully with the complicated questions involved in the management of the large properties involved has been a definite and a permanent one.

Water was first available in Turlock irrigation district in 1901, in which year it was used on 3,757 acres. Holdings were scattered widely over the district and any satisfactory delivery of water was out of the question. Few in the district had had experience in irrigation, and in their ignorance of their own difficulties and of difficulties of the district officers many expected far more from the district than it was possible for the district to give. The first few years were therefore naturally stormy ones and meetings of dissenters were frequent and often acrimonious. Being wholly unused to the handling of million-dollar corporations, the farmer-directors, always naturally conservative, felt their way with extra caution and hesitated to spend even pennies where dollars were required for efficient administration. In spite of continual agitation there was only slow improvement in the earlier crude conditions for seven or eight years, and neither the first nor the second nor the third superintendent was able to come up to the expectations of the water users. Happily, conditions have greatly changed in Turlock district in the last few years. Although to state that there is no longer any trouble would be far in excess of the truth, nevertheless the better attitude of the people of the district toward its management is not the least of the district's present assets. The harness-shop desk room of the first superintendent, paid for by him, has given way to substantial office quarters on the main street of Turlock owned by the district, where at least the essential needs of both engineering corps and office force are provided. So, also, ample automobile conveyance, furnished by the district, has replaced the slower team conveyance of the first years which the superintendent of the district was expected to supply at his own expense. In place of the almost total absence of any records whatever, either as to the running of water or the physical condition of the system, as in the early years of operation, data are now available in quite complete form for nearly every phase of the district's various activities. The first superintendent had few if any facilities for establishing anything like an equitable distribution of water, either among the various laterals or among the users. He had little knowledge of seepage losses on the system and no means of making measurements. The present engineer has two men with current meters constantly employed in determining losses and aiding in the measurement of water to the various distributaries and in assisting the ditchtenders in maintaining the standard "heads." And now with the data at his command the engineer is able to direct such division of the water as will result in delivering to each ditchtender the amount necessary to give him his pro rata share of the entire supply after allowing for seepage and evaporation losses in transit. By knowing the amount of water, in acre-feet, delivered daily to each ditchtender and by having delivery receipts from each irrigator receiving water the engineer is able to keep a close check on the work of the ditchtenders. While it can not be said that distribution is yet always wholly satisfactory either to the engineer or to all of the irrigators, yet conditions both in the handling of the water and in the reasonableness of the irrigators have so greatly improved that water distribution in Turlock district is no longer a source of constant friction.

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[1] For additional data on the present status of Turlock irrigation district, *see* the report on this district by the Irrigation District Bond Commission of California, dated June 25, 1914. California State Printing Office, 1914.

The present area of Turlock irrigation district is 175,566 acres, 644 acres having been withdrawn in March, 1911. The number of taxpayers has increased from 400 in 1901 to 5,000 in 1914, and the area irrigated from 3,757 acres in 1901 to 95,698 acres, or about 55 per cent of the total area in the district, in 1915. Along with this increase in the number of taxpayers and the area irrigated there has necessarily come an increase in the extent of the works and in the bonded indebtedness. The total length of canals and main laterals has grown from 135.16 miles in 1900 to 230.57 miles in 1915, not counting about 700 miles of sublaterals; the bonded indebtedness has increased from $1,170,000.00 in 1901 to $2,302,400.00, or $13.11 per acre, at the close of 1914, all bonds except the original funded issue bearing 5 per cent. This increase in bonded indebtedness has raised the tax rate from $2.40 in 1901 to $3.65 in 1914, and the total tax for both bonds and maintenance and operation from $40,766.40 in 1901 to $370,829.89 in 1914. With this increase in tax rate, however, has come an increase in the amount of water run, from a maximum of 535 cubic feet per second in 1904, the first year of keeping records, to a maximum of 1,580 cubic feet per second in 1915. During these years the total assessed valuation within the district has gone up from $1,788,589.00 to $10,165,890.00.

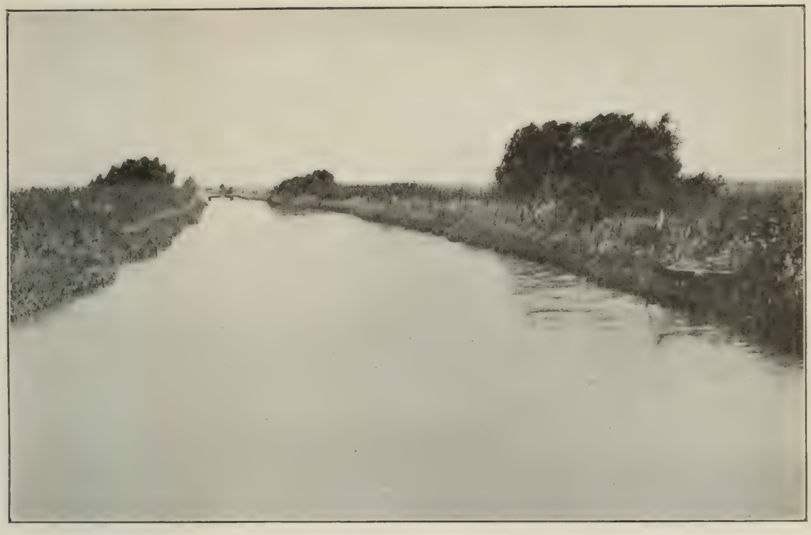

Fig. 1.—Ceres main of Turlock Canal.

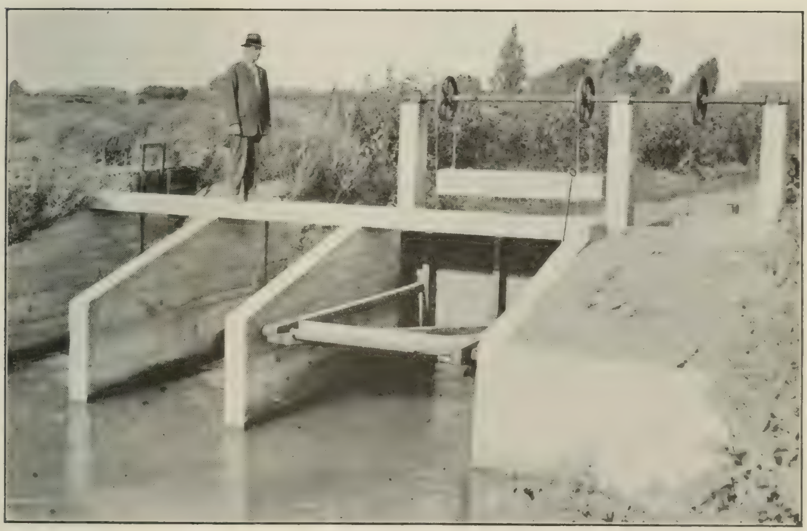

Fig. 2.—Typical concrete check with automatic regulating gate, Turlock Irrigation District.

The increased expenditures on capital account since 1901 have been mainly applied to improvements in the upper works, the construction of the Davis foothill reservoir, the construction of new laterals from the old system or the extension of laterals already built, the construction of the high-line canal 28.97 miles long, together with various cross ditches and laterals, and the substitution of permanent for the former temporary structures in different parts of the system. Improvements in the upper works have included new headworks and controlling gates, the elimination of about 900 lineal feet of wooden flumes and the construction in their place of concrete-lined hydraulic fills, the concreting of points in the main canal where seepage was heavy and the banks unsafe, and the reconstruction or the widening and deepening of portions of the main canal above Hickman. Surveys have been made and some preliminary work done and land purchased for an additional reservoir on Tuolumne River about five miles above La Grange, but no provision has yet been made for the cost of construction. Automatic regulating gates have been installed at all principal division points and at many points of minor importance. The present plans of the district, if carried out, will result, in addition to further storage, in completing the enlargement of the main canal to a capacity of 2,000 cubic feet per second from La Grange to Hickman and improving the present distributing system, including the construction of several new laterals necessary to reach land now coming into cultivation and the lining of canals and laterals. The construction of the works of the district and their improvement have not been accomplished without both mistakes and unforeseen difficulties and more than once breaks in the upper works have caused serious damage and not infrequently loss of crops through temporary stopping of the water supply. For an enterprise with such large capital investment and such important construction as Turlock district shows there has undoubtedly been undue conservatism in the employment of special engineering advice, yet the generally satisfactory outcome, both as to acre-costs and character of works, must be considered a definite achievement.

In determining valuations for irrigation district purposes the assessor of Turlock irrigation district is now endeavoring to appraise land at about 50 per cent of its market value. Prior to 1910 it was usual to take the county assessment roll in making up the district assessment roll. In that year the district assessor raised all of the lands $20.00 per acre regardless of their value, which of course resulted in a very much larger percentage of increase on the low-valued lands than on those that were valued high. That arrangement, however, was only temporary, although the present assessor has held to the valuations of $20.00 above the county assessment on average land of the district. The highest valuation placed on any of the farm lands in the district is now

$80.00 per acre. Land too high to receive water from the canals, but which can still be used for dry-farming, is assessed at $15.00. Land that has been swamped by irrigation is valued at $1.00. Land available for suburban subdivision adjoining the city limits of Turlock in some cases runs up to a valuation of $150.00 per acre. Around other towns in the district assessment is entirely on a farm land basis. The assessor is now endeavoring to consider all of the elements that make up market value, as character of soil, proximity to town, etc. Up to 1915 the town property has been given a value slightly below that carried on the county assessment roll, this favoring of the towns having been considered justifiable because of the extra local taxes there for town improvements. Land in all of the towns is carried at the figures given on the county assessment roll, which are estimated to range from 40 to 50 per cent of market value. In 1914 the district voted to exempt improvements from irrigation district taxes.

Turlock irrigation district has tried various methods of supervising water distribution and delivery. At first both maintenance and operation and all engineering work were in the hands of the engineer and superintendent. Later a superintendent of water delivery was placed directly under the board and the duties of the engineer were confined to engineering matters. There has recently been a demand for putting the entire responsibility for engineering and distribution in the hands of a single official and that plan is now followed, an assistant engineer attending to water delivery under the direction of the chief engineer. Water delivery records are kept in both field and office. In January each ditchtender goes over his entire division and receives from each irrigator applications for water for the pending season, specifying the acreage of each crop to be irrigated. These applications are copied in alphabetical order into a book in the district office and form a permanent record. There is also kept in the office a typewritten list of the irrigators under each ditchtender, arranged in the order in which they are to receive water, and showing the number of acres each is to irrigate. Gauges are installed at the point each ditchtender receives his supply from the main canal and also at each point of delivery. All land is irrigated in rotation, beginning at the lower end of the canals, the average alfalfa ''head'' being 20 cubic feet per second measured at heads of private ditches and the time allowed usually being thirty minutes to the acre which, after allowing for seepage, gives a depth of approximately .60 foot over each acre for each irrigation. Where 10 cubic feet per second is delivered one hour is allowed in order to give the same quantity. This smaller head is called for only for orchard and other furrow irrigation. When there is an abundance of water the time of irrigation is extended on account of high checks or other conditions making distribution difficult. In the delivery of water, receipts are taken in triplicate from each irrigator, the original being sent to the office at Turlock, one copy being given to the irrigator, and one copy retained by the ditchtender. Private ditches are all maintained by the irrigators who receive water from them. Some of these are in poor condition and where such is the case the district frequently refuses to turn in water until conditions are improved. At present thirty-one ditchtenders are employed, mostly at the rate of $75.00 per month, and their time for eight months is charged to operation and for four months to maintenance. A machine shop is maintained with a machinist at $100.00 per month, a blacksmith at $3.50 per day, and a helper at $2.50 per day. There is also maintained a repair camp with a foreman at $90.00 per month, two helpers at $72.50 per month, a cook at $45.00 per month, and eight day employees at wages ranging from $2.25 to $3.00; also a ditch maintenance camp with a foreman at $75.00 per month, and fifteen teamsters, helpers, laborers, and carpenters at wages ranging from $2.25 per day to $50.00 per month. The expense of the repair camp is charged to maintenance and operation for eight months and to new work for four months each year, and that of the ditch maintenance camp to maintenance and operation for four months and to new work for eight months. The cost of superintendence of maintenance and operation, including all measurement of water, is $600.00 per month for eight months each year. The general office force at Turlock consists of the secretary at $100.00 per month, bookkeeper at $100.00 per month, assessor-collector-treasurer at $175.00 per month, and clerical and other help at a total of $115.00 per month.

Alfalfa is still the principal irrigated crop in Turlock district, the acreage devoted to it in 1915 being 64,558 acres. Other crops and acreages are: vines, 3,208 acres; trees, 4,722 acres; garden, 837 acres; corn, 5,870 acres; beans, 863 acres; sweet potatoes, 3,151 acres; melons, 3,840 acres; grain, 5,594 acres; miscellaneous, 1,660 acres; berries, 9 acres; new land, 743 acres; nursery, 643 acres.

In recent years it has been the policy of the board of directors of Turlock district personally to give a great deal of their attention to the physical properties of the district. For this purpose they have met frequently and have frequently gone over the district works, especially during reconstruction and important repairs. The law allows directors a per diem of $4.00 for each day devoted to the affairs of the district. The total amount received by them in fees in 1914 amounted to approximately $2,500.00, indicating that on the average each director devoted about 125 days to district affairs during the year. It is estimated that during 1915, however, each director will average only about three or four days per month. At present the directors work largely through standing committees which change frequently in order to keep the various members of the board in close touch with district affairs.

Except in one or two instances, it is believed that the boards of directors of the district have worked harmoniously together, yet there has been some local public criticism of the policy of the board under which its members frequently undertake to determine matters about which only the engineer of the district, or better, a consulting engineering specialist, is best able to judge. Out of this situation there has grown up a considerable sentiment in favor of the employment of a district general manager with whom final responsibility should be lodged. The recall has been employed in Turlock district on only two occasions, and then against individual members of the board of directors. In each case it was unsuccessful, the incumbents being retained by substantial majorities.

ALTA.

This district is the third largest in California, with 130,000 acres. Although during the hard years following the early nineties and prior to the bond settlement and refunding in 1901 and 1902 it was in poor financial condition, it has never ceased activity since organization in 1888, and is now in a generally prosperous condition. Old wooden structures are gradually being replaced with concrete, the cost of this being paid from annual assessments for maintenance, operation, and betterments. Work of this character done since the bond settlement in 1901 and 1902 has included a new main headgate of reinforced concrete in Kings River, costing about $9,000.00; a light concrete dam 96 feet long at Wahtoke Creek, costing only about $250.00; 1,500 lineal feet of 4-inch concrete lining in the main canal at Dunnigan Gap where the canal is 50 feet wide on the bottom, costing about $9,000.00; about 250 concrete drops replacing wooden structures and costing from $100.00 to $500.00 each; a concrete flume across Sand Creek, costing about $500.00, and the lining of sections in a number of laterals. In all it is estimated by the superintendent that two-thirds of the wooden structures on the main laterals have been replaced with concrete. The system is in such shape now that 1,300 cubic feet of water per second can be carried and distributed whenever that amount is available from the river and is wanted by the irrigators.

Irrigation practice in Alta irrigation district is still very wasteful. No measurements are made to irrigators and except in very dry years they are given whatever water they want. As a rule, the land has not been well prepared. Usually both orchards and vineyards, which together make up more than one-fourth of the crops grown, are irrigated, and most generally by various methods of basin flooding, the application of as much as 1.5 to 2 feet in depth per irrigation being not at all uncommon. Several thousand acres in the district are still in grain, but this is not irrigated much now. About 15 per cent of the farms now have pumping plants to supplement gravity irrigation, when the Kings River supply gives out, as it usually does by July. No steps have been yet taken by the district to provide drainage, which is still needed in parts of the district. No ground water records have been kept, but the superintendent of the district states that in the dry years of 1913 and 1914 the water table lowered in sections about four feet. About Reedley it now stands at ten to twenty feet below the surface in the fall of the year, according to information furnished by the superintendent, and at five to seven feet below the surface about Dinuba. In the southwestern portion of the district it is generally higher, especially when water is being run.

Alta irrigation district is operated at a relatively low cost. Assessments for operation, maintenance, and betterments since 1910 have ranged from $27,500.00 to $35,000.00, or not over an average of 25 cents per acre per year. Valuations of farm properties for district assessment purposes have with a few variations ranged from $30.00 per acre for the best lands down through successive and somewhat arbitrary grades of $27.50, $25.00, $20.00, $15.00, $12.50, $10.00, $7.50, $5.00, $3.00, and $2.50, the two lowest valuations being for some alkali lands in the two southern divisions. Land of good quality lying adjacent to the canals, but just too high to receive water by gravity, is valued at $10.00 to $20.00 on the ground that it is benefited by subirrigation. Improvements on farm properties are assessed in about the same ratio. All of the several towns of the district, including Dinuba, Reedley, and Traver, are within the legal boundaries. Lot valuations range from $20.00 to $60.00 for a 20-foot by 150-foot lot, exclusive of improvements, the latter being added at about 20 per cent of their cash value. In the district assessment of 1914 town lots were given a total value of $128,504.00; improvements on town lots, $204,505.00; real estate other than town lots, $2,348,733.00; improvements thereon, $356,965.00; miscellaneous properties, $6,000.00; total, $3,044,707.00. It will be noted that town properties carry about 11 per cent of the total district tax. The assessor of the district, individually or through deputies, visits each tract in the district for district assessment purposes yearly and requires an individual declaration from each property holder, as in the case of city and county general assessments in California. Alta is the only irrigation district visited in which this practice is followed.

The operation of Alta irrigation district has resulted in greatly reducing the size of land holdings and in increasing the number of district taxpayers from about 800 in 1895 to about 3,100 in 1914. There are now more holdings of 20 acres than of any other size, many of 40 acres, a few of 160 acres and under 320 acres, and an occasional half-section. Originally there were many full sections in the district and some holdings of several sections.

The salaried force of Alta district is modestly paid, the superintendent receiving $1,500.00, the assessor $800.00, the collector $800.00, the secretary $600.00, and the treasurer a nominal salary only. While the board of directors hold the usual monthly meetings and confer with the superintendent, and occasionally send out a committee of one or two board members to make special observations, the management of the physical properties of the district is left almost wholly to the superintendent. No delivery records are kept and, as already stated, no measurements are made to irrigators. At present the delivery force under the superintendent consists of seventeen men, each of whom receives $75.00 per month for six to seven months yearly as ditchtenders, and day wages at other times during the year when their services can be used in repair work and canal cleaning. The district builds and maintains all gates on canals and laterals situated on rights of way owned by the district.

Although the funding bonds issued by Alta district in 1902 do not begin falling due until 1921, bonds to the value of $41,500.00 have already been redeemed from surplus interest assessments, 68 having been taken at .932 and the remaining 15 at from .896 to .95. It is the policy of the district to reduce bonds whenever there is a surplus in the bond fund of $5,000.00 or $6,000.00. The present bonded indebtedness is $451,000.00, or at the rate of only $3.47 per acre. No bonds have been issued since the funding bonds of 1902.

TULARE.

The community served by Tulare district has made definite progress since its bond settlement in 1903, and there has been a considerable improvement of the irrigation systems. As an organization, however, Tulare district has not advanced materially. So severe was the lesson of the old bond indebtedness that since that was wiped off and the bonds burned the community has been very much averse to using the taxing power of the district law. With the exception of one assessment of $10,000.00 in 1909 for betterments, none has been levied since the settlement, the entire cost of maintenance and operation and of some minor betterments having been met from water tolls. Owing to the wide fluctuation in the amount of water used each year, which is dependent on the supply available to the district from Kaweah and St. Johns rivers, the amount raised from tolls has also fluctuated. The smallest annual income of record was that of 1913 when only about 100 acres was watered and only $141.75 received from tolls. The largest area ever irrigated is estimated by the superintendent at 15,000 acres. Eliminating the year 1913 above referred to, the total tolls from 1909 to 1914 have ranged from $2,981.85 in 1912 to $10,475.20 in 1911. It is estimated by the superintendent that about 6,000 acres will be

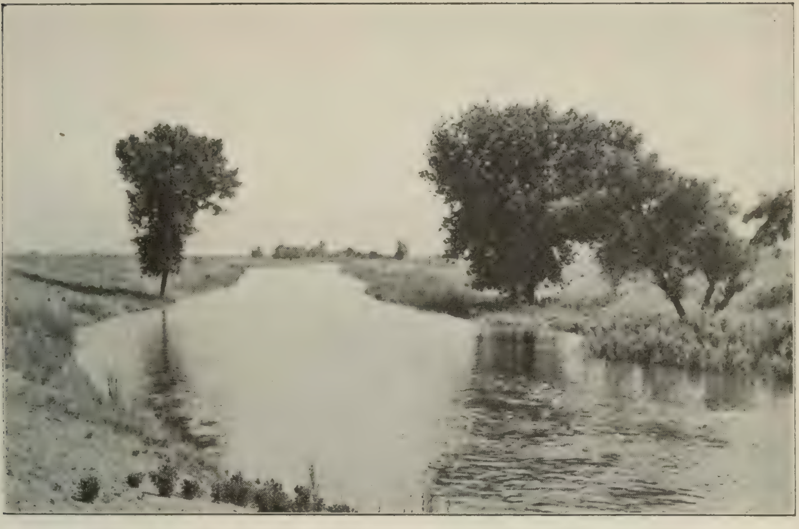

Fig. 1.—Alta Irrigation District Canal near Wahtoke Lake.

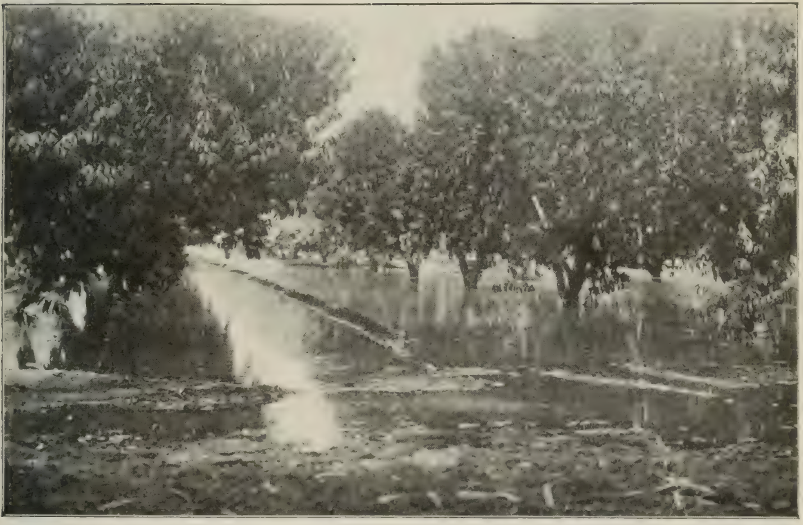

Fig. 2.—Typical orchard irrigation in Alta Irrigation District. (Note excessive use of water.)

watered in 1915. The tolls charged for water are usually $1.50 per acre for the first irrigation and $1.00 per acre for each subsequent irrigation, although they have in times past been as low as 50 cents per acre per irrigation.

The improvements made in the works of Tulare irrigation district have not involved any large expenditures. A concrete siphon 300 feet long under Kaweah River, with a claimed capacity under an 8-foot head of 300 cubic feet per second, cost $3,200.00. Most of the wooden check gates in the canals above Tulare have been replaced by concrete checks at an average cost estimated by the superintendent at $250.00. A concrete structure at the Cameron Creek crossing of the main canal, so built as to permit the passage of Cameron Creek when so desired, involved an expenditure of $1,500.00. Other improvements, with approximate costs when known, have been as follows: Raising and repairing of dam at the St. Johns River intake, about $300.00; wasteway one-quarter mile below the dam, about $250.00; repairs to span at St. Johns River crossing, about $700.00; replacing of second span at St. Johns crossing; new wooden delivery headgates. In addition to these improvements, twelve acres have been purchased for a right of way in Cameron Creek at a cost of $2,500.00.

The original area included in Tulare district was 39,360 acres, but some lands have been excluded since organization and the exact present area is not known by the district officers, but it is still probably in excess of 35,000 acres. The city of Tulare, covering about three full sections, was taken out in 1911 and about 750 acres was taken out two years later.

The principal irrigated crop in Tulare district is still alfalfa. As a rule orchards and vineyards, due to the availability of ground water, are irrigated only in the drier years. Grain crops are not watered, but after harvesting the grain many irrigate the land and plant Kaffir or Jerusalem corn. The district has no storage reservoir and, as a rule, the water available after satisfying prior rights runs out by July 15th. After that, however, pumping from underground sources is resorted to, a large majority of the farmers having installed pumping plants in the dry years 1912 and 1913 if they had not already done so before. These pumping plants have done much both to improve the available water supply and to reduce danger from the rise of ground water. Most farmers in the district irrigate only once from the district canals, except that when the season makes it desirable to irrigate as early as March, a second irrigation is called for. Rarely a third irrigation from the canal system is practiced.

The irrigation system of Tulare irrigation district is operated very economically. The superintendent, receiving $125.00 per month, and the secretary, who furnishes the district office quarters, receiving $35.00 per month, are the only members of the force who are continuously employed. One headgate man is given a house and his provisions and a salary of $65.00 per month for about six months each year. Three ditchtenders are usually employed during the irrigation season at $2.50 per day, each ditchtender furnishing and maintaining his own conveyance. During the nonoperating season such help is employed as is needed to do whatever work money is available for, this amount, as already indicated, depending on the quantity of water available during the months irrigators want it. Water is delivered in rotation, commencing at the upper end of the various delivery divisions, except that no water is delivered except as paid for in advance at the office of the secretary of the district in Tulare. On receiving application and payment for water the secretary issues a written order on a special printed form and this reaches the proper ditchtender through the superintendent, all ditchtenders reporting in person to the superintendent in the district office daily and at other times by telephone. The district canal system carries from 300 to 350 cubic feet per second and the usual delivery head is ten cubic feet per second, each user being allowed to retain the water as long as desired. Usually irrigators are given as much water as their ditches can carry. As a result of the lack of restrictions in delivery the use of water is very ununiform and generally wasteful. The district builds and maintains all gates and checks on the main canal and on all distributing laterals, exclusive of those on farms. The management of the system is, in practice, entirely in the hands of the superintendent, the members of the board of directors giving very little attention to it, and knowing little of its physical condition. It is said that there are never any contests for places on the directorate.

In connection with the management of Tulare irrigation district it should be noted that, because all maintenance and operation expenses are paid from water tolls collected only from those who use water from the canals, the landowners in the district who do not irrigate from the district system pay nothing toward its maintenance or toward the maintenance of the water supply in which all have a share. In other words, although all in the district have a right to receive water from the district, they pay nothing for the privilege unless they use water from the canals.

ALPAUGH.

This district was organized March 22, 1915, after consideration extending over several years. The land embraced is the principal portion of Alpaugh Colony and is located in Tulare County on a slightly raised portion of the old bed of Tulare Lake. Alpaugh Colony was established in 1906 by a colonization company that had purchased about 9,000 acres of land situated seven miles southwest of Angiola.

PLATE X.

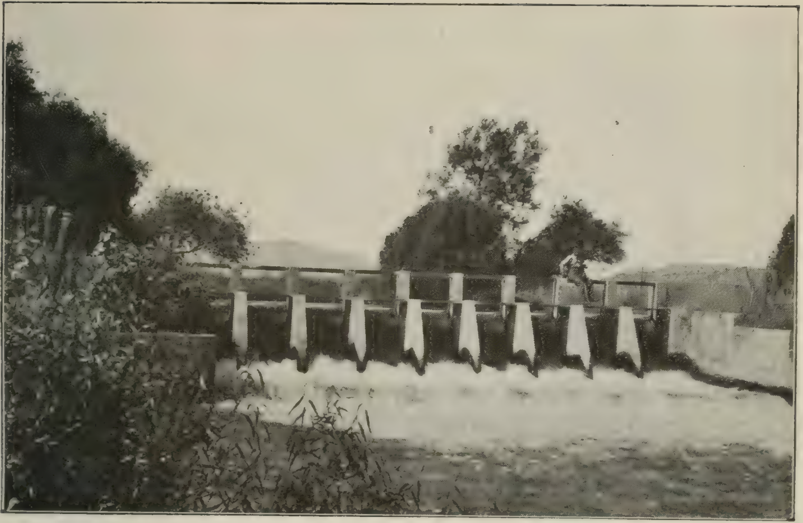

Fig. 1.—Concrete spill and crossing, Alta Irrigation District Canal.

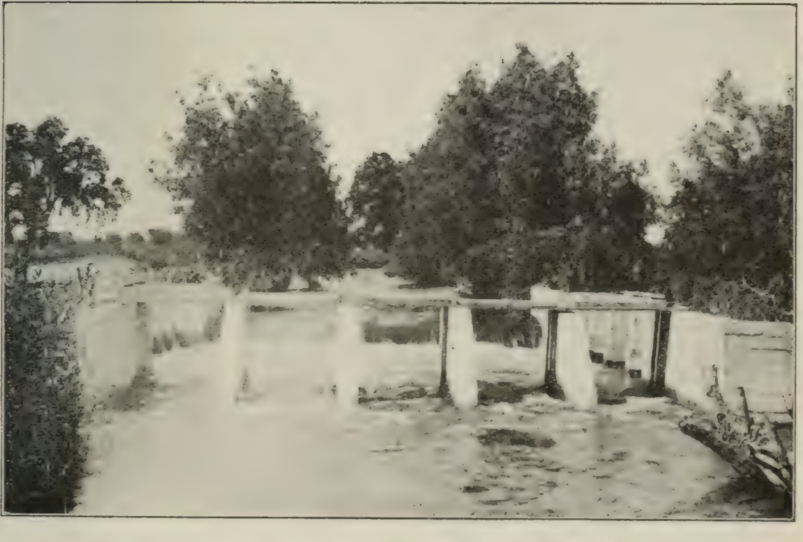

Fig. 2.—Cameron Creek crossing, Tulare Irrigation District Canal.

The land in this colony was sold to the settlers at $19.00 per acre, each acre carrying one share in the Second Extension Water Company, for which $6.00 additional was charged. The agreement under which the colony was established provided that, through the Second Extension Water Company, water should be furnished the settlers at the rate of 200 inches for twelve hours once every thirty days for each share of stock held in the water company. The original plan is said to have provided that this water should be developed within the colony. That plan, however, was changed, and instead a supply was developed from a number of flowing wells at Smyrna, in Kern County, 9.5 miles south of the colony. This supply is still used and is reported to amount to about 900 inches in the winter months and to from 500 to 600 inches in summer, in both cases measured at the wells. From the wells it is carried to within one mile of Alpaugh through a 12-mile open ditch and at that point is pumped a total height of about seven feet for distribution over the colony. As operated by the Second Extension Water Company, the cost of maintenance and operation is met by frequent assessments on the stock, all stock being liable for these assessments regardless of whether water is used. The usual assessment has been 60 cents per share and this amount was levied five times in 1913 and in 1914, and it is expected that it will be levied five times during 1915. While about 9,000 shares of stock in the water company were sold, only about 7,000 shares are still in good standing, some of the nonresident owners having ceased paying assessments.

Alpaugh irrigation district was organized to take over the property of the Second Extension Water Company, the election on organization having been carried by a vote of 71 to 14. At a previous election, on August 26, 1914, 53 votes were cast in favor of the district and 22 votes against it, but as there were 13 additional votes cast for officers of the district which were not marked for or against the district organization, it was held that the 53 votes cast in favor of the organization did not constitute the required two-thirds of the total vote and the election was declared lost.

The purpose of the organization of Alpaugh district has not been merely to substitute an irrigation district for a mutual water company for operating purposes, but in order to finance improvements. The supply now being obtained from Smyrna is inadequate for the needs of the colony, largely because of being conveyed in an open canal in which seepage losses are heavy and in which tule growth greatly reduces the flow. This canal varies in width from 25 to 45 feet and the grade is only about one foot per mile. Plans for improving and enlarging the water system have not yet been settled upon by the district.[1] The petition for organization specified that the water supply was to be obtained from wells already sunk or to be sunk in sections 23, 26, and 27, township 25 south, range 23 east, and from other wells in that vicinity and in the district. It is locally hoped that a supply can be obtained within or near the district in order to avoid the long carriage from Smyrna. If the Smyrna supply is continued it is proposed to cement the canal. The district has already spent about $1,000.00 in surveys and other preliminary expenses, having raised the necessary money for this purpose by issuing seven per cent warrants, which were taken over by a Visalia bank and discounted to bring the bank eight per cent. When the engineering plans are completed they will be submitted to the State Department of Engineering and if approved will be the basis of a bond issue. As the district proposes to build a first-class distributing system, as well as to increase the water supply, it is expected that the cost per acre will approach $30.00 to $40.00.

The irrigated area in Alpaugh irrigation district is now something over 2,500 acres, of which about 1,500 acres are in alfalfa, about 300 acres in seeds, and the rest in sugar beets and grain. The assessed valuation of the district according to the county assessment roll of 1914 was $111,837.00. The petition for organizing the district carried 182 names which, it is said, represented about two-thirds of the property owners and about two-thirds of the total value of the land. In laying out the district an attempt was made to keep the land within the district in a solid block, but since organization several holdings have been eliminated. The town of Alpaugh is not included.

Alpaugh irrigation district was not formed without considerable opposition. During the campaign for the district a number of printed pamphlets were issued giving arguments for and against it. The first petition for the formation of irrigation district was circulated in a portion of the colony in 1912 and then dropped in order to eliminate the townsite of Alpaugh. The second petition met further opposition and was also dropped. A third petition was declared inadequate by the board of supervisors because it contained the signatures of those who were then owners of lands in the colony, rather than of those whose names appeared on the previous assessment roll. It is now stated by the officers of the district that in the main those who most actively opposed the formation of the district have since either been won over or moved away. The exclusion of several tracts of land originally in the district also served to eliminate some of the opposition.

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[1] Plans have since been adopted and after material modification by the State Department of Engineering have been approved and construction has been largely completed; payments therefor having been made in warrants pending validation of the bonds by the state irrigation district bond commission.

PLATE XI.

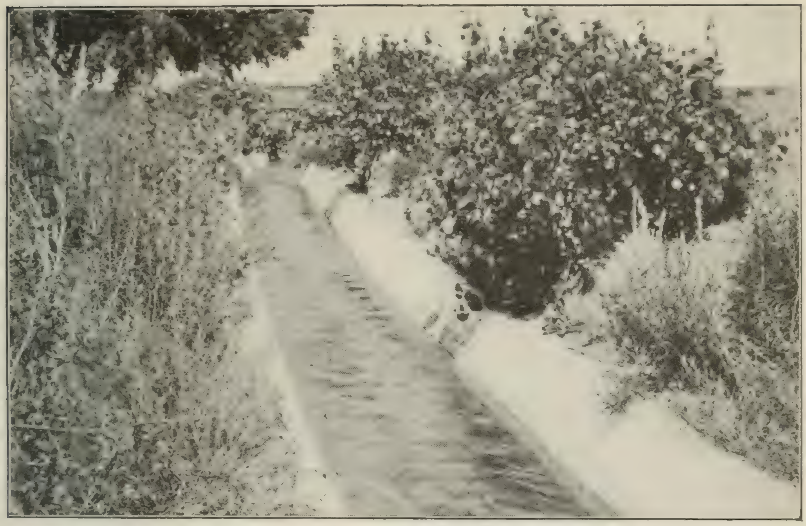

Fig. 1.—Reconstructed Main Ditch, Little Rock Creek Irrigation District.

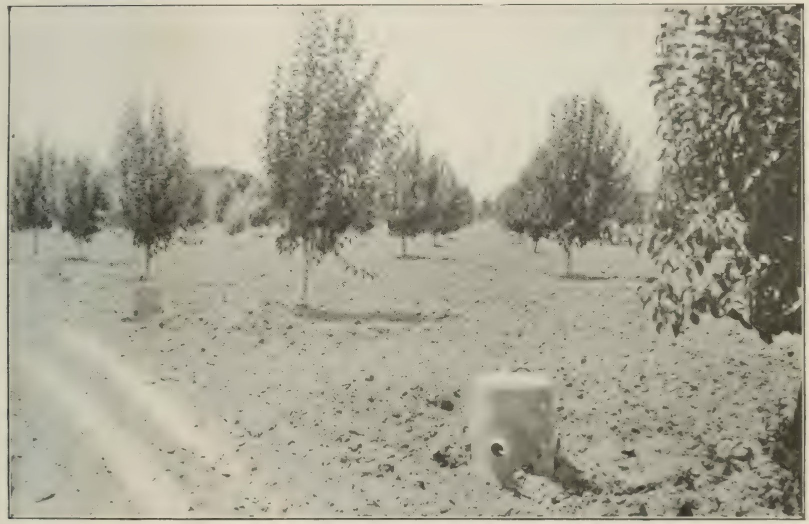

Fig. 2.—Underground distributing system, Little Rock Creek Irrigation District.

LITTLE ROCK CREEK.

Since the financial reorganization of this district during the past four years, physical and agricultural conditions have been greatly improved. The principal ditch from Little Rock Creek has been lined with concrete for the first three miles, and a concrete pipe from 16 to 20 inches in diameter substituted for the remaining distance. Distribution from the main ditch is effected through underground concrete pipes, the principal laterals having been constructed by the district and the farm laterals, so far as yet built, by the landowners. Delivery from the main laterals to the farms is made through concrete boxes of the Azusa type and from the farm laterals through concrete standpipes. These improvements in the irrigation system, except the farm laterals paid for by the landowners, have been made with the $35,000.00 bond issue voted in addition to the $25,000.00 issue used for refunding the old bonds. The saving in seepage losses that has been brought about by the improvements has permitted an extension of the irrigated area, there being between 1,400 and 1,500 acres, mostly in Bartlett pears, under cultivation in the summer of 1915. Most of the land in the district, however, is still owned by nonresidents, and there are several subdivisions, laid out some years ago, which have not been largely used or occupied. Some of the latter and one considerable acreage holding have been going delinquent in the matter of district taxes until there is some discussion of having the areas involved eliminated from the district, if that proves feasible.

On the basis of valuations for district assessment purposes of $30.00 per acre in the upper portion of the district, of $20.00 per acre in the lower portion, and of $10.00 each for lots, the 1914 equalized district assessment for the whole district totaled $77,678.00. With the distributing system now extended to the lower areas they will henceforth be assessed at the same figure as those formerly alone within reach of the water system. The 1914 rate of assessment for bond interest and maintenance and operation was ten cents on the dollar.

A single ditchtender attends to water delivery in the district, working through the irrigation season only. Water is not measured. The cost of delivery has thus far been met entirely by assessments but it is contemplated that a water toll will be added for water pumped after the gravity supply in Little Rock Creek falls off. The source of pumped water is a cienega owned by the district near the head of the main ditch. About forty voters voted at the district election in 1913.

BIG ROCK CREEK.

This was one of the early Wright districts and the essential features of its early history have already been given. In May, 1914, a third movement to colonize the district was begun by a group of Los Angeles socialists who have established there the Llano del Rio Cooperative Colony. This colony and the Mescal Water and Land Company together have purchased about 3,000 acres of land in the district and additional purchases up to about 20,000 acres are contemplated. Nearly all of the land in the district is now said to be patented. At the instance of those back of this movement a new board of directors for the district was appointed by the supervisors of Los Angeles County in 1914, and in February, 1915, a board and other necessary officers were elected by the colonists. Of these officers the president and secretary are the vice president and assistant secretary, respectively, of the colony company, all of the other officers also being members of the colony. Thus the district is merely an adjunct of the colony, it being understood that the officers of the district will conform to the general control exercised by the officers of the colony.

On reviving Big Rock Creek irrigation district the Llano del Rio colony proceeded to clean out, repair and extend the old district ditches. To avoid litigation the colony also purchased certain water claims adverse to the district that had been sold to the district at the time of organization in 1891. Water is diverted from Big Rock Creek in two places, each heading consisting of a temporary rock dam and wooden headgate. The half-mile tunnel constructed several years after the first failure is still utilized, but does not yield a large supply of water. None of the ditches are yet lined and it is locally estimated that more than one-half of the water diverted is lost in transit. Ultimately, however, it is proposed to line the main ditch with cobble stones and to use vitrified clay pipe, to be made by the colonists, for laterals. It is also proposed to build a reservoir directly above the junction of Rock and Pallett creeks. Run-off data for Rock Creek are meager, so that the water supply available is uncertain. Previous failures having proven the direct flow of this stream to be altogether undependable, the future of this later development will depend first of all on the feasibility and possibility of storage. With an abnormal flow in Big Rock Creek during recent wet years Llano colony has been enabled to accomplish a considerable agricultural development. In July, 1915, the area under cultivation approximated 700 acres, the irrigated crops including alfalfa, pears, apples, peaches, apricots, almonds, grapes, small fruits, corn, truck, and a few sugar beets. The fruit that is expected to receive the principal attention of the colonists is the Bartlett pear. Land in the colony is all held by the colony corporation rather than by individual

PLATE XII.

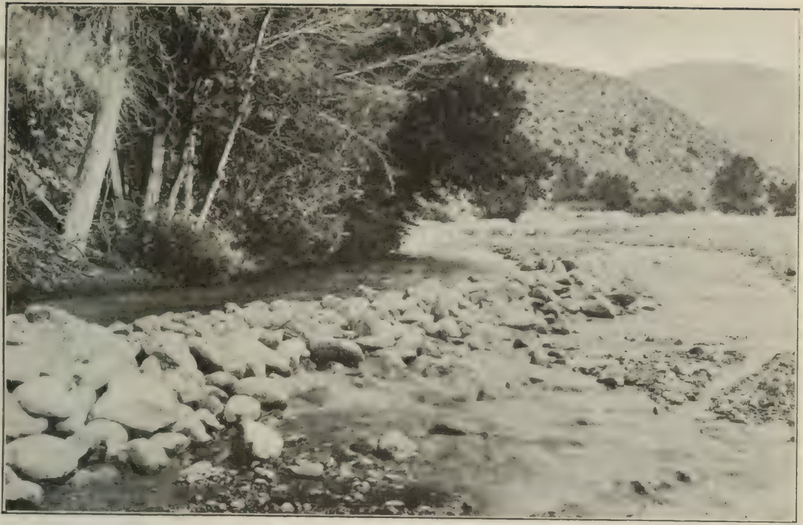

Fig. 1.—Big Rock Creek at head of Big Rock Creek Irrigation District Ditch, June 30, 1915. (Water above normal.)

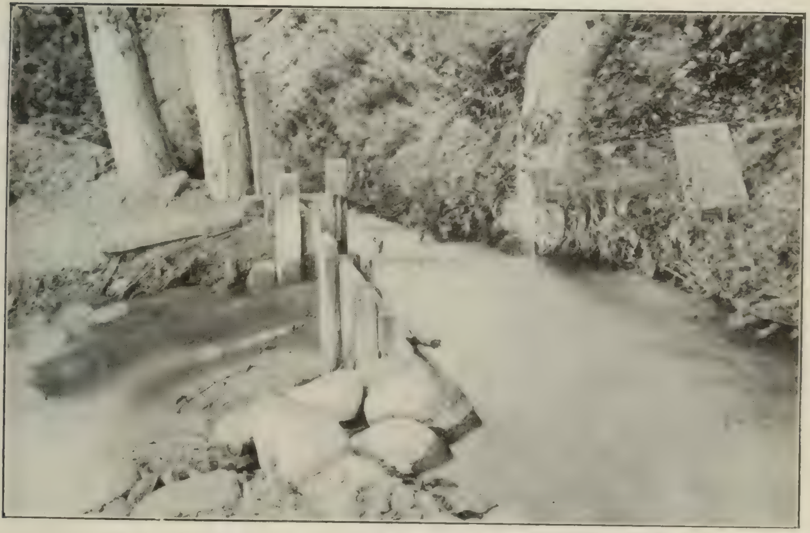

Fig. 2.—Head of Big Rock Creek Irrigation District Ditch.

colonists, the colonists merely holding memberships and most of them living in the town of Llano rather than on farms. The colony now has about 400 members living in the district.

BLACK ROCK.

This district was carried January 27, 1915, by a vote of eight for and none against organization. The total area, according to the latest figures furnished by the secretary, is 1,750 acres, of which 1,090 is government land under some form of entry and 660 acres is patented. The land included is in 29 separate parcels ranging from 20 to 200 acres in area and in June, 1915, was held by 27 owners. According to information furnished by the secretary the petition for organization carried the names of or subsequently received the approval of all but six of the landowners, and all who voted at the organization election are said to belong to the families of actual residents of the district. Most of the land that is still unpatented has been filed on within the past two years, several entries having been made in order to be included in the district.

Black Rock irrigation district lies in township 11 south, range 34 east, Mt. Diablo base and meridian, on the west side of Owens River Valley midway between Independence and Big Pine, Inyo County. The lands of the district are generally a plain sloping from the base of the mountains to the floor of the valley, this plain being somewhat broken with ravines and intervening low ridges. The original sources of water planned on were Red Mountain Creek and wells. It was proposed to purchase water rights in Red Mountain Creek from a local mutual water company, which is in turn controlled by a local orchard company. This plan, however, has been abandoned, and the directors are now seeking satisfactory underground sources. The plans for a distributing system submitted by the engineer employed by the district call for 41,773 lineal feet of cement-lined ditches, the estimated cost of which is given as $14,173.00. In reporting on the feasibility of this district in May, 1915, the State Department of Engineering assumes a net duty of water of 1.8 acre-feet per acre per year and estimates that a flow of 10 cubic feet per second, exclusive of transit losses, will be required in order to supply the maximum amount required in any one month. Allowing for transit and application losses of 20 per cent, the amount required during the month of maximum use, when it is assumed, on the basis of local data, that 23 per cent of the total seasonal quantity used will be applied, is given as 12.8 cubic feet per second.

WALNUT.

There has been little if any change in the status of this district from that outlined in the history of the district already given. A substantial concrete intake box has been built at the lower point of waste from the

Standifer or Ranchita users, with a 30-inch concrete pipe under the Santa Fe track connecting the intake box with the concrete-lined ditch above. Inside of the district line 4,600 feet of concrete main pipe lines have been laid ranging in size from 36 inches down to 24 inches, the remainder of the main distributing system being open concrete-lined ditches, with two main branches. Water is still charged for at the rate of ten cents per "head" for twenty-four hours and most of the time sufficient water is available. There has been some misunderstanding with the Standifer or Ranchita users as to the right of the district to receive any day water, the former claiming the entire day supply to the exclusion of the district. A readjustment of this difficulty seems to be pending.

LA MESA, LEMON GROVE, AND SPRING VALLEY.[1]

The question of bringing water to the "back country" of San Diego County has occupied a large share of the attention of the people of that county for nearly two generations. With agricultural conditions admittedly favorable to the successful growth of citrus and other valuable fruits, with climatic and other physical features such as to make the section exceedingly attractive for residence purposes, but with only a meager normal rainfall and a water supply entirely inadequate for irrigating all of the tillable lands of the county, the need for conserving such water as the various local drainage basins afford has long been obvious. The most active movement in that direction occurred in the late eighties and early nineties with the formation of the numerous Wright irrigation districts that were scattered from Escondido to Otay, but which, for reasons already cited, and after being rather violent storm centers for a number of years, finally one after another ceased activity. After the old irrigation districts came private water development and development by mutual water companies, the newer enterprises in several instances taking over rights and works acquired by the districts. Recently the city of San Diego has taken over the properties of one of the larger private interests and still more recently, on October 17, 1913, La Mesa, Lemon Grove, and Spring Valley irrigation district, in part covering territory included in one of the old Wright districts, has been organized to improve the water situation of several of the communities dependent on the San Diego River supply.

La Mesa, Lemon Grove, and Spring Valley irrigation district embraces 14,794 acres around the rural communities from which it takes its name. These communities have been supplied by the Cuyamaca Water Company, which is the successor of the old San Diego Flume Company,

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[1] According to last available information activity in this district has been postponed pending negotiations to include it in a municipal water district along with the city of San Diego, to which it is adjacent.

PLATE XIII.

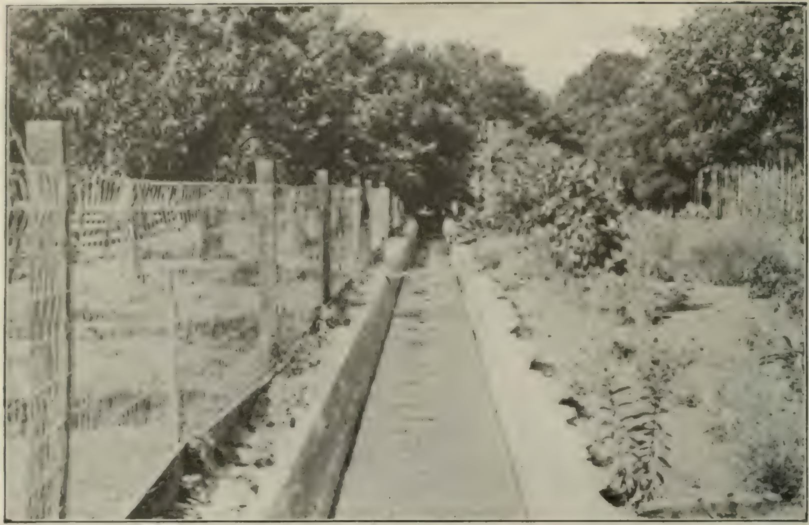

Fig. 1.—Main Ditch of Walnut Irrigation District.

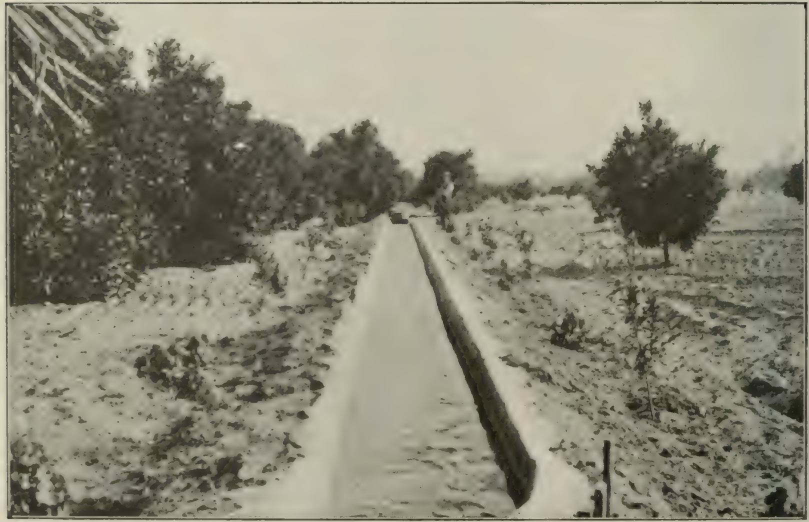

Fig. 2.—Lateral Ditch in Walnut Irrigation District.

local distribution having been attended to by small mutual water companies. Irrigation water rights have generally called for a continuous flow of water at an annual cost of $70.00 per miner's inch, but water has not usually been needed in the winter months, and has frequently not been available when most wanted in the summer. The Cuyamaca system was built in early days when permanent irrigation construction was not common and it has not kept pace with the needs of the communities it has served, which, in addition to La Mesa, Lemon Grove, and Spring Valley, have included El Cajon Valley, La Mesa Heights, and part of East San Diego. In the dry fall of 1911 the necessity for community action in water matters became very evident, and led by the consumers of Spring Valley, an agitation began which finally resulted in the formation of La Mesa, Lemon Grove, and Spring Valley irrigation district. The first steps taken were for the formation of a municipal water district under the municipal water district act of May 1, 1911, and such a district was formed by a vote of 429 to one, September 23, 1912. Some difficulties encountered under that form of organization led to the substitution of the irrigation district and this was organized by a vote of 397 to three.

The area embraced within La Mesa, Lemon Grove, and Spring Valley irrigation district is practically a suburb of the city of San Diego. While some 1,200 to 1,300 acres are already in groves, mostly lemon, and some 7,500 acres have been used from time to time for dry-farmed grain, the section has already become largely used for residence purposes. The town of La Mesa embraces approximately 2,000 acres and while there are a few holdings of several hundred acres within the town limits that have not been subdivided, subdivision plats for most of La Mesa have been recorded and the area will always be essentially a residence one. Outside of La Mesa some 28 recorded subdivisions embrace approximately another 2,000 acres, but as development progresses readjustments of holdings will undoubtedly reduce the number of resident lots. In the lemon section around Lemon Grove 600 or 700 acres are already in groves of mostly five and ten acres, with homes of their owners already established on them. In the same section an additional area of equal extent has been disposed of in holdings of similar sizes and only awaits an additional water supply before being planted and occupied. Much of the area within the district is too rough for cultivation and suitable only for homesites. The entire area within the district that is not susceptible of cultivation has been estimated at about 2,000 acres, but in the absence of a careful soil classification it is not possible to determine how much can be profitably cultivated. To any one at all familiar with southern California communities, however, it is evident that the feasibility of an irrigation district such as that around La Mesa, Lemon Grove, and Spring Valley can not wholly be determined by the area of land on which groves will be commercially profitable, for when a dependable water supply is obtained the number of strictly home holdings is sure to increase greatly, so that La Mesa, Lemon Grove, and Spring Valley irrigation district more nearly approaches a municipality than is usual among irrigation districts elsewhere.

When La Mesa, Lemon Grove, and Spring Valley irrigation district was organized San Diego River was given as the source of the proposed water supply. After organization an engineer was employed to make a careful study of the feasibility of that source and to outline a complete system of works. The report of the engineer filed in January, 1914, recommended storage on San Diego River just above Mission Valley and but a few miles from the district line. His plan called for an arch dam 103.5 feet high about three-fourths of a mile below the old Mission dam, the water to be impounded amounting to 34,000 acre-feet. Hydrographic data considered in the study of the engineer indicated that during 18 out of 26 years embraced in the available record, water could be taken from the main reservoir at an elevation of 245 feet and delivered through a 24-inch pipe line to the main pump, 4,200 feet down the canyon, at an elevation of 240 feet. From this pumping plant it would be lifted against a total head of 362 feet to the main distributing reservoir, but as about 3,000 acres of the district lie above the main distributing reservoir, a high level service was proposed that should start at an elevation of 700 feet from a high-level reservoir of 2,000,000 gallons capacity. The distributing system leading from the reservoirs as outlined in the plan was to be entirely of riveted-steel pipe, a 12-inch diameter being used on the high-pressure line and from a 36-inch diameter down on the remainder. The plan further provided that when the surface reservoir on San Diego River should become exhausted pumping from wells in the upper portion of the reservoir site should be resorted to. The ultimate supply of water estimated in the report to be furnished was 1,000 inches, but the distributing system planned provided for the handling of only 500 inches for the present. The costs estimated by the engineer were as follows: Dam and reservoir, $733,958.00; wells and pumping plants in upper portion of reservoir site, $133,002.00; main pumping plant, force mains, and summit tunnel, $173,950.00; distributing system, including reservoirs, $246,760.00; total, $1,287,580.00, or at the rate of $87.03 per acre, counting entire area in the district. In estimating the amount of water necessary the engineer counted on one acre-foot per acre per year over 12,000 acres. The report stated that while it was realized that a more abundant supply of water would be desirable if available, the situation in San Diego County is governed by the amount which may be depended on rather than the amount which may be an ideal quantity.

On the basis of the engineer's report above outlined an election was held on May 4, 1914, on a proposition to issue the bonds called for in the report. The petition for this election was signed by 799 property owners of the district and the election was carried by a vote of 541 to 10, showing practical unanimity as to the desirability of going ahead. Since that election the district officers have been endeavoring to adjust possible differences over the rights to San Diego River, particularly with the city of San Diego. They have further entered into an agreement with the owners of the Cuyamaca water system to purchase that system in district bonds at par and at a price to be set by the State Railroad Commission, whose decision is expected at any time.[1] The purchase of the Cuyamaca system, if carried through, will necessarily to some extent alter the engineer's plan for storage in and pumping from El Cajon reservoir. The district has been negotiating with the city of San Diego for the joint ownership of the Cuyamaca system, but in the event that such joint ownership is not entered into and the district itself purchases that system according to the agreement with its owners it is expected that the system will be improved and extended as needed to meet immediate demands, the first work probably being the enlargement of the distributing system, the raising of the La Mesa dam, and the construction of an additional reservoir in the mountains.

After La Mesa, Lemon Grove, and Spring Valley irrigation district was organized a valuation of the property by the district officers totaled $4,254,500.00. The values used were taken to be those at which property had changed hands. The valuation assessed for district purposes in 1914 approximated $2,000,000.00, of which $709,000.00 was for city and town lots, the assessors having endeavored to enter the lots at about 40 per cent of their sale value and acreage property at about 50 per cent of its sale value. The maximum acreage valuation outside of the town of La Mesa was $250.00. In La Mesa the base for acreage assessments was $350.00 per acre and the property within the town limits not yet subdivided but subject to subdivision was entered at $400.00 per acre. Outside of La Mesa assessments ranged from $75.00 to $250.00 per acre and lots from $20.00 to $150.00, the latter being for lots 50 feet by 140 feet in the main business section of Lemon Grove. In the city of La Mesa the average assessment for lots was about $250.00 outside of the main business section. In 1914 the assessor found approximately 9,000 separate parcels of land within the district, of which not over 25 were in holdings exceeding 70 acres, these 25 larger holdings embracing a total of approximately 6,500 acres.

Financial operations of La Mesa, Lemon Grove, and Spring Valley district to date have included an assessment of seven mills on a valuation of $2,709,000.00 in 1914, yielding a total of $18,963.00, without the allowance for delinquencies, and also a sale of $55,550.00 of the bonds voted in May, 1914, at prices ranging from 85 to par. Of the bonds sold $45,000.00 were paid for land in the El Cajon reservoir site, other bond and assessment expenditures having gone for engineering and general expenses.

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[1] This decision has since been rendered and a valuation of $745,000.00 placed on the Cuyamaca system. Some difficulty, however, has arisen in connection with the proposed transfer.

SAN YSIDRO.[1]

This is the smallest irrigation district in California, probably the smallest in any of the states, containing only 485 acres. It was formed in 1911 in order to effect a financial reorganization of the water situation in the Little Landers Colony established in Tia Juana Valley, San Diego County, in 1909. The district lies wholly within the old Otay district formed under the organized Wright act and as Otay district has never been dissolved, it was necessary before San Ysidro district could be formed to revive Otay district sufficiently to enable the San Ysidro lands to be excluded. The election on organization of San Ysidro district was held March 11, 1911, and was carried unanimously. After approval by the state irrigation district bond commission, a $25,000.00 five per cent bond issue for reconstructing the irrigation system of the colony was voted December 12, 1912, the entire issue being subsequently sold for cash to a San Diego bank for $25,010.00. The new works built by the district included pipe lines, costing $17,360.17; wells, costing $1,014.37; pump, motor, and pump house, costing $4,915.49; reservoir No. 1, costing $1,319.49, and reservoir No. 2, costing $918.62. Adding $1,480.60 for engineering and superintendence, the total original cost was approximately $27,000.00. Since these works were finished additions have brought the total cost to about $28,000.00.

San Ysidro irrigation district is operated on a combined toll and assessment basis. At first assessments were levied for bond interest only, other expenses being met by monthly water tolls of $1.25 per acre for acreage property and of $1.50 for each 50-foot by 100-foot lot and domestic use thereon. Beginning in 1916, it is planned to collect a greater portion by assessments and to reduce monthly water tolls to about 50 cents per acre for acreage property, 30 cents for each lot, and 60 cents for domestic use in each house. Under this plan more of the financial burden will be borne by nonresident owners than at present. A slight readjustment of the valuations for assessment purposes, by which there will be a more careful differentiation as to character and location of the holdings, is also planned. Up to 1915 all farming lands

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[1] In the floods in Tia Juana River in January, 1916, the main pumping plant of San Ysidro irrigation district was washed away and all of the bottom lands partially or wholly destroyed. The district is now obtaining water from a temporary pumping plant.

PLATE XIV.

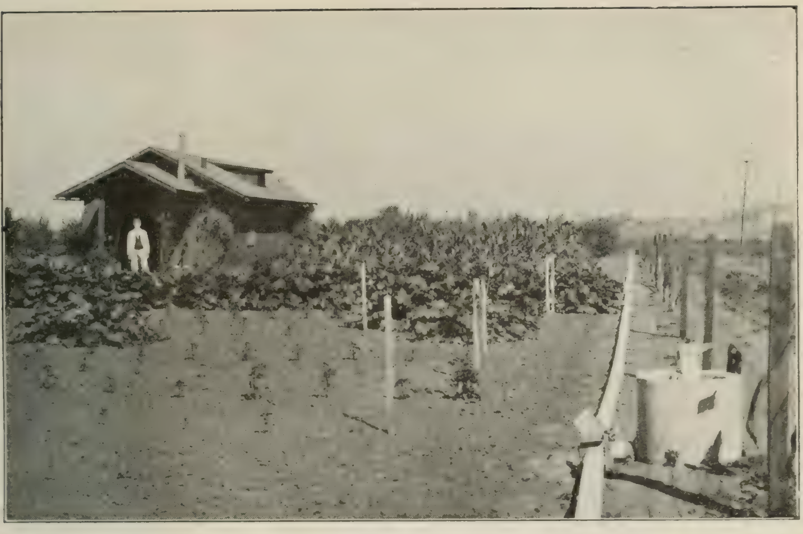

Fig. 1.—Typical Two-acre Farm in San Ysidro Irrigation District, showing distributing hydrant and pipe.

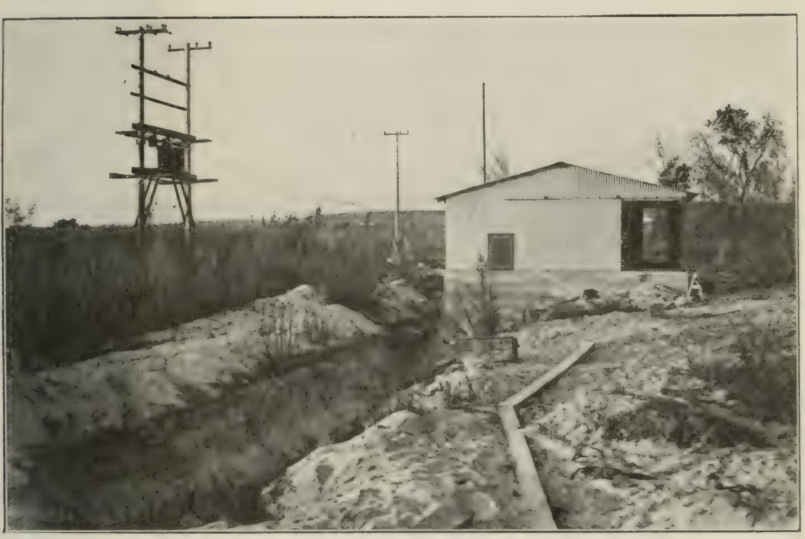

Fig. 2.—Main Pumping Plant, San Ysidro Irrigation District.

on both mesa and bottoms have been assessed at $100.00 per acre and nearly all lots, whether business or residence, at $75.00 each. The total assessed valuation according to this rating was $69,778.00 in 1914, improvements not being counted. The ruling sale price of the mesa and bottom lands, respectively, is now $750.00 to $800.00 and $500.00, and mesa lands being preferable for residence and the bottom lands for farming.

Little Landers Colony, for which San Ysidro irrigation district furnishes the water supply, was originally laid out in one-acre farms and the occupied holdings are mostly of that area or only a little larger. As an irrigation district San Ysidro district is therefore unique. In its close settlement it has, along with La Mesa, Lemon Grove, and Spring Valley irrigation district, a distinctly municipal character. Water distribution, however, is mainly on an irrigation basis. On the bottom lands 8-inch to 15-inch concrete pipe is used while on the mesa the distributaries are of riveted steel and three inches to twelve inches in diameter. The district builds and maintains a pipe line to each holding. While two distributing reservoirs have been built only the lower one is now needed. Small weirs have been installed on the bottom lands for measuring deliveries to users. Water delivery is in charge of a zanjero and, including his salary and the salary of a powerhouse attendant, and also the monthly power bill, the total monthly cost of managing and operating the district is only a little over $200.00. The district has never defaulted in any payments and has a balance in the bank to care for emergencies. There are now about 140 families resident in the colony.

IMPERIAL.

Imperial district, organized July 14, 1911, by a vote of 1,304 to 360 and containing 523,600 acres, the largest district in the state, is not yet sufficiently advanced in the carrying out of its plans to justify more than a brief comment in this report. The purpose of organizing was to acquire the physical properties of the California Development Company, which now delivers water to Imperial Valley from Colorado River. The character of the present organization of the irrigation system of Imperial Valley is so well understood that it is not necessary to state here more than that the water delivered by the California Development Company is now sold to a number of mutual water companies—seven thus far organized—which in turn deliver it to the irrigators.[1] Under this plan of organization, which was that put into effect by the California Development Company as a part of its general plan for the reclamation of Imperial Valley, there has occurred, as is very well known, a very remarkable change within the period of fifteen years—a change from an absolutely arid waste to an irrigated empire approaching 400,000 acres in area, containing a large number of thriving towns and cities, a population estimated at in excess of 30,000, and an equalized assessment of real property, less improvements, as levied for irrigation district purposes, of over $25,000,000.00. The principal condition immediately leading up to the formation of the district was the bankruptcy of the parent California Development Company and the consequent inability of that company to fulfill its obligations to the various mutual water companies and to the settlers. For a number of years it was evident that the irrigation system of the valley must be fully reorganized and its control in some manner passed to the people of the valley. Many of those holding land for which stock in some one of the mutual water companies had not been purchased, and who were anxious to obtain water for that land, and especially the people centering around the county seat of El Centro, were strongly in favor of the district plan. On the other hand, many of the earlier settlers who paid a substantial amount for mutual water company stock, and more particularly those who have been most closely associated with and the principal beneficiaries of the parent company, believed that reorganization on the mutual plan, possibly involving the organization by the various stockholders of the mutual water companies of a holding company to take over the property of the California Development Company, would be preferable. For some time the controversy between the various factions was earnest and bitter, but as indicated by the vote on organization given above, the proponents of the irrigation district plan greatly outnumbered those who preferred a holding company. Even after the organization of the district the opposition sought to contest the confirmation of its organization in court, but later yielded in the face of a preponderance of opinion against them, so that confirmation by the lower court was accomplished and affirmed by the supreme court. Subsequently the levying of the first assessment was contested in the case of *Imperial Land Company* vs. *Imperial Irrigation District,* but the assessment was sustained by the lower court, from which appeal was taken and is still pending.[1] When, after over three years of study and consideration, the directors of the district, after being petitioned by several hundred more landowners than legally required, representing nearly $4,000,000.00 in valuation in excess of the majority stipulated by the law, submitted to the electors of the district for decision on October 29, 1914, a proposition to issue bonds in the sum of $3,500,000.00 for the purpose of acquiring the works of the California Development Com-

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[1] A very complete report on irrigation in Imperial Valley, prepared by Mr. C. E. Tait, Irrigation Engineer, Office of Public Roads and Rural Engineering, was printed in 1908 as U. S. Senate Document No. 246, 60th Congress, 1st Session, and can probably be consulted in libraries.

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[1] This decision has since been rendered in favor of the district.

PLATE XV.

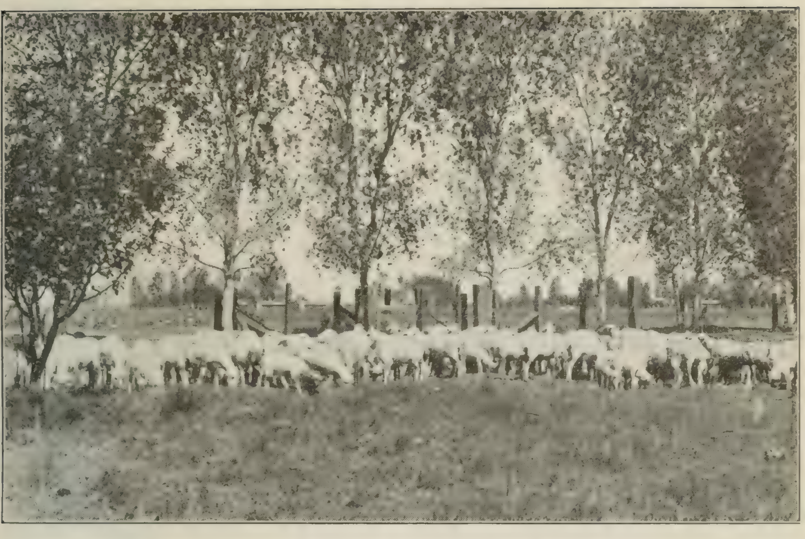

Fig. 1.—Typical Farm Scene in Imperial Irrigation District.

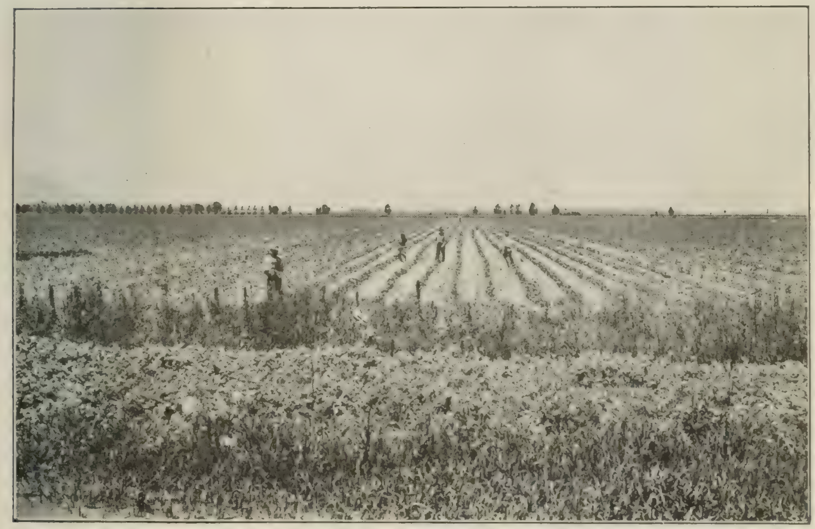

Fig. 2.—Young Cotton Furrowed for Irrigation, Imperial Irrigation District.

pany, a still further effort was made to organize the opposing forces. Even in the town of Imperial, however, which had been the stronghold of the opposition, the majority in favor of the bonds was 132 out of a total vote of 446, while the vote in El Centro precinct was 1,013 in favor of the bonds to 16 against, and in the entire district 3,278 for to 330 against them—a majority of practically ten to one. While many of those who originally opposed the formation of the irrigation district are still of the belief that some other form of organization would have been preferable, further opposition of a substantial character does not now seem likely.

The legal conditions surrounding the acquirement of the works of the California Development Company have thus far prevented the final consummation of the plans of the district to take over those works. The largest interest involved is that of the Southern Pacific Company, which is under agreement with the district to relinquish its claim for the sum of $2,152,500.00 in money or 5 per cent bonds of the district at par. There are, however, other judgment creditors of the California Development Company, notably the New Liverpool Salt Company, which holds a judgment dated January 10, 1908, in the sum of $458,246.23, with interest from that date. According to a report by the chief engineer and general manager of the district made public by the directors in June, 1915, the sum of $5,049,554.78 would have been necessary, on July 1, 1915, to pay out of court all outstanding judgments and interest in full, of which $3,772,128.52 represented the interest of the Southern Pacific Company, including their Mexican holdings. Offsetting against this latter amount the price agreed upon between the district and the Southern Pacific Company, $1,277,426.26 remained as the full amount of the claims on July 1 of all other creditors, making $3,429,926.26 the sum to be paid in out of court settlement, if no reduction were to be made in the claim of the judgment creditors other than the Southern Pacific Company. Final adjustment of the matter is, in September, 1915, still awaiting the outcome of an appeal to the supreme court in the case of *Title Insurance and Trust Company* vs. *California Development Company, Southern Pacific Company, New Liverpool Salt Company et al.*, directing the sale as a whole of the properties of the California Development Company, in order to satisfy the various judgments entered. During the continuance of this and other material litigation there has been much difference of opinion among the people of the district as to the best policy to pursue, some holding out strongly for delaying any settlement until the litigation is finally settled, and others maintaining that, even if waiting will result in the district acquiring the properties of the California Development Company at less than their face or the agreed values, the loss due to existing complications in control warrants an immediate settlement on the best terms that can be obtained.[1]

In accordance with its agreement with the Southern Pacific Company looking to the purchase of the works of the California Development Company, Imperial irrigation district sought, and obtained, from the California legislature of 1915 validation of the $3,500,000.00 bond issue authorized October 29, 1914.[2] The legislature also authorized the district to acquire works of the California Development Company and its subsidiary companies and successors in California and Mexico by condemnation or purchase, and in case of purchase, to exchange bonds of the district for all or part of the system, provided that the whole bond exchange should not exceed $3,000,000.00.[3] It might be noted here that a constitutional amendment approved by the people November 3, 1914, permits the purchase by irrigation districts, in certain cases, of the stock of any foreign corporation owning the part of any international water system situated in a foreign country—in this case the stock of the Mexican company controlling the portion of the property of the California Development Company lying in Mexico. Prior to voting on the bond issue referred to, the proposed works and the proposed purchase of the system of the California Development Company, and the issuance of the bonds, were approved according to law by the State Engineer. When this bond issue was proposed it was expected, as it still is, that the system of the California Development Company, including all outstanding judgments, could be purchased for something less than $3,000,000.00, but $500,000.00 was included in the issue as an emergency fund to take care of possible needed flood protection along Colorado River.

Assessments have been levied in Imperial district from year to year to cover general expenses, the rate having been two mills on the dollar in 1913 and 1914 and seven mills on the dollar in 1915, the latter being intended to yield $153,324.00. The total equalized district assessment for 1915 is $25,768,837.00. It is interesting to note that although a large part of the land in Imperial district is still unpatented, owners of unpatented lands, in spite of the fact that no lien can be attached to such lands through an irrigation district assessment, pay their assessments as readily as those who have patented land. It is fully recognized that land in Imperial Valley is worthless without water, and as the supply when properly distributed is admitted to be ample, there is no hesitancy in the payment of assessments on account of the lack of patent. In making up the district assessment roll the assessor of the district appraises all good farm lands in the district at the rate of $50.00 per acre. Land which it is impracticable to irrigate, or which is too heavily impregnated with alkali to be valuable, is assessed at from $5.00 to $25.00 per acre, and river bottom lands at about $5.00 per acre. Town lots are assessed at county valuations, acreage within the incorporated town limits at $100.00 per acre, and land in unincorporated areas, but in tracts and subdivisions and having maps recorded, at $75.00 per acre.

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[1] The Imperial system was finally taken over by Imperial irrigation district in the summer of 1916.

[2] Statutes 1915, chapter 17.

[3] Statutes 1915, chapter 172. A general statute was also passed (Statutes 1915, chapter 507) providing that bonds of irrigation districts authorized by a vote of four-fifths of the electors shall be held valid, and as the $3,500,000.00 bond issue of Imperial district was carried by more than four-fifths of the electors voting, this act is a further validation of the Imperial bonds. Imperial district bonds were also validated by the superior court of Imperial County, April 6, 1915.

Lying in Imperial Valley but outside of Imperial irrigation district are large areas of land which would be productive if waters could be supplied. There is some difference of opinion as to the total area in the valley that can ultimately be watered, but there is a general agreement that a considerably larger area than that included in the district will ultimately be brought under irrigation. A petition which, it is said, is likely to receive favorable consideration by the directors, and which requests the inclusion in the district of about 100,000 acres embraced in a narrow strip east and north of the district extending from the Mexican boundary to the shoreline of Salton Sea, has already been presented to the directors. Part of the land included is now submerged by Salton Sea, but with the recession of its waters this land will become agricultural and the owners of it have signified their willingness to pay a nominal district assessment on it while still under water.[1]

When the plans of Imperial irrigation district to take over the system of the California Development Company are finally consummated, as they undoubtedly must and will be, an interesting question will arise as to the continuance of the present mutual water companies which are distributing the water supplied by the California Development Company. The shareholders of the mutual water companies have in general seemed to hold out for a continuance of distribution through the medium of these companies, which are admittedly very efficiently managed. Water is paid for by the irrigators at fifty cents per acre-foot, which is the price paid by the mutual companies to the California Development Company, the stockholders of the mutual companies, however, paying annual assessments for maintenance and operation in addition to the water charge. A general basis for the settlement of this question has not yet been reached.

Imperial district has gone on record as approving the idea that the affairs of large irrigation districts should be mainly in the hands of a general manager, and they called to that position the man who originally worked out and later carried into effect the organization of the parent promoting company. When originally appointed his salary was fixed at $750.00 per month—the largest salary paid by any irrigation district—but pending the final purchase of the water system by the district the salary of the manager, as well as the salaries of other officers, including the board of directors, have been reduced to a minimum.

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[1] Since the above was printed the area of Imperial district has been increased from 523,600 acres to 576,600 acres.

COURT DECISIONS AFFECTING CALIFORNIA IRRIGATION DISTRICTS.

The extent of litigation involving California irrigation districts was brought out in the history of activities under the original Wright act. A study of the reported cases in the California supreme and federal courts discloses ninety-one decisions that have construed the original act or the act of 1897 and amendments and supplementary statutes.[1] Many points have been taken up in the decisions. For the first few years attacks on the law were mainly directed against its constitutionality, although in most of the early litigation involving constitutionality many other points were considered. Also, many of the cases hinged on the validity of assessments and on tax sales. The more recent cases have largely involved the collection of interest and principal of bonds of the old districts that were abandoned. The various decisions that have been rendered and the resulting clarification of the district law are quite fully discussed by the standard law writers on irrigation and water rights,[2] but for the benefit of those to whom the standard law books are not available, and in order to present some of the facts of the decisions in brief form, the decisions on a few of the main principles involved, particularly those of especial interest to those contemplating the organization of irrigation districts, are briefly epitomized below.

CONSTITUTIONALITY.

A total of 20 cases have been found involving the constitutionality of the California irrigation district law, of which at least four in the California supreme court and two in the federal courts considered the broad principles of the law. It will be remembered that the Wright act was passed in 1887 and it might be recalled that 30 districts were formed up to and including 1891 and 19 more up to and including 1895. Almost as soon as the early districts were organized opposing owners of large ranches and of town lots within the towns included in the districts sought to defeat the districts by attacking the constitutionality of the law, but by December, 1891, four leading decisions had been handed down by the California supreme court upholding it. In *Turlock Irrigation District* vs. *Williams,*[1] decided May 31, 1888, the act was held constitutional on the ground that a district organized under it was at least a *quasi* public corporation and as such was entitled to levy assessments and condemn property in the manner and for the uses described in the statute. The same view as to the *quasi* public nature of irrigation districts was taken in *Central Irrigation District* vs. *De Lappe,*[2] in which it was also held that the proceedings for organization should be liberally construed. In *Crall* vs. *Poso Irrigation District*[3] it was further stated that the legislature had power to pass such an act and this same ground was taken in *In re Madera Irrigation District,*[4] decided December 14, 1891, which also held among other things that all lands within a district need not be directly benefited by irrigation to constitute a public use. In these decisions the question of the taking of private property for private use and without due process of law were quite conclusively settled, so far as the state courts were concerned, in favor of the law. In the first federal case involving constitutionality, however, that of *Bradley* vs. *Fallbrook Irrigation District,*[5] it was held that the taking of private property to furnish water to land owners alone is not sufficiently a public use, and that the Wright act was invalid as authorizing the taking of private property without due process of law. This adverse decision practically halted for a time all activity under the law, but in the quite celebrated case of *Fallbrook Irrigation District* vs. *Bradley,*[6] decided November 16, 1896, the adverse decision of the lower federal court was reversed and it was held that the provision of the Wright act for confirming or contesting an irrigation district tax brings the proceeding within "due process of law"; that the irrigation of arid lands is a public purpose; and that the irrigation district legislation furnishes ample due process of law and is constitutional. The constitutionality of the Wright act in so far as its general principles are involved has not been questioned since this decision, but both before and after it the constitutionality of certain features of the district law has been questioned and carried to the state and federal courts.[7] So far as adversely affecting constitutionality is concerned the net results of the additional litigation have been decisions that a technical portion of section 4 of the confirmation act of 1889,[1] a portion of section 17 of the Wright act as amended in 1893 (authorizing boards of directors, as additional security for the payment of bonds, to pledge by mortgage, trust deed, or otherwise, all property of the district),[2] and section 4 of the act of 1897 (providing for appeal from the board of supervisors directly to the superior court),[3] all of which sections have since been amended to meet objections raised to them, were unconstitutional.

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[1] A complete list of irrigation district cases in the California supreme court and in the federal courts with subjects dealt with is given in the addenda.

[2] For a general review of decisions reference is made to Wiel, Samuel C., Water Rights in the Western States, 3d ed., 1911, and Kinney, Clesson S., A Treatise on the Law of Irrigation and Water Rights, 2d ed., 1912.

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[1] 76 Cal. 360.

[2] 79 Cal. 351.

[3] 87 Cal. 140.

[4] 92 Cal. 296.

[5] 68 Fed. 948.

[6] 164 U. S. 112.

[7] In addition to cases cited, see *In re Central Irrigation District*, 117 Cal. 382; *Lahman* vs. *Hatch*, 124 Cal. 1; *People* vs. *Linda Vista Irrigation District*, 128 Cal. 477; *Escondido High School District* vs. *Escondido Seminary*, 130 Cal. 128; *Nevada National Bank* vs. *Board of Supervisors of Kern County*, 91 Pac. 122; *Fogg* vs. *Perris Irrigation District*, 154 Cal. 209; *In re South San Joaquin Irrigation District*, 161 Cal. 345; *Imperial Water Company No. 1* vs. *Board of Supervisors of Imperial County*, 162 Cal. 14; *Tregea* vs. *Modesto Irrigation District*, 164 U. S. 179; *Herring* vs. *Modesto Irrigation District*, 95 Fed. 705, and *People ex rel. Brady* vs. *Browns Valley Irrigation District*, 119 Fed. 535.

ORGANIZATION.

The first case in the California supreme court in which the details of the organization of irrigation districts were considered was *Central Irrigation District* vs. *De Lappe*,[4] decided May 31, 1889. It was held in this case that the primary purpose of the organization of an irrigation district is to perform certain important public functions, and that a reasonably liberal rule of construction should be adopted by the courts to carry out the purposes of the law. In *Fallbrook Irrigation District* vs. *Abila*[5] it was held that the term ''freeholders owning lands'' must be strictly construed to mean owners of land in the general and unqualified sense of the term, so that they may fully appreciate the responsibilities they are about to incur. In *Cullen* vs. *Glendora Water Company*[6] it was held that an agreement between the organizers of an irrigation district and a water company for taking over the system does not render the organization of the district fraudulent if it is not shown that the organizers do not intend to carry out the agreement. In the same case it was held that the inclusion of unpatented railroad land does not make the organization of a district invalid. In *In re Central Irrigation District*[7] it was held that the holders of small residence lots in towns and cities are not such owners of land within the meaning of the Wright act as to make them qualified signers of the original petition for the organization of the district. Instead, it was held that such qualified signers must be *bona fide* owners of agricultural land desiring to improve it by conducting water upon it. In *Fogg* vs. *Perris Irrigation District*[8] it was stated that the fact that a majority of those signing a petition as freeholders were such only temporarily and nominally, on the agreement that land conveyed to them should be reconveyed after the organization, was a fraud. In *Imperial Water Company No. 1* vs. *Board of Super-*

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[1] *Cullen et al.* vs. *The Glendora Water Company*, 113 Cal. 503.

[2] *Merchants' National Bank of San Diego* vs. *Escondido Irrigation District*, 144 Cal. 329.

[3] *Chinn et al.* vs. *Superior Court of San Joaquin County*, 156 Cal. 478.

[4] 79 Cal. 351.

[5] 106 Cal. 355, 365.

[6] 113 Cal. 503.

[7] 117 Cal. 382.

[8] 154 Cal. 209.

visors of Imperial County,[1] decided January 8, 1912, it was held that where town lots are not irrigable and their owners are not eligible as petitioners, they must be rejected; also, that the board of supervisors has power to include within the boundaries of an irrigation district land not within the boundaries set out in the petition. In *Herring* vs. *Modesto Irrigation District*[2] it was held, following closely the decision of the United States supreme court in *Fallbrook Irrigation District* vs. *Bradley*,[3] that the question of benefits to be derived from irrigation in a proposed district is to be decided by the county supervisors and that in the absence of fraud or bad faith on their part their decision is conclusive.[4]

ASSESSMENTS.

There have been so many decisions affecting assessments and so many of these have dealt with technical legal matters that no effort will be made to summarize them fully. In general, it may be said that in numerous early cases the broad principle was laid down that the method of making and collecting assessments for irrigation districts need not follow exactly the mode provided for in the constitution for taxation for general state purposes, the distinction being recognized between general taxation and its restrictions and assessments for local improvements;[5] that although an apportionment of expenses for local improvements is to be made according to the benefits received by the property assessed, yet the power to make such apportionment rests on the general power of taxation, and the apportionment itself does not depend upon the fact of local benefit in any other sense than that all taxes are supposed to be based upon the benefit received by the taxpayer;[6] that it is within the power of the legislature to subject state lands to any just liability of the character in question, but the legislature has no such power over the public lands of the United States;[7] and that the board of directors may exercise discretion as to the amount of assessment to be collected, for while its action is subject to the control of the judiciary, and the collection of an assessment may be enjoined in case the board should seek to raise an excessive amount,[8] the courts have no authority to determine the amount to be raised or what proportion of the assessments shall be collected.

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[1] 162 Cal. 14.
[2] 95 Fed. 705.
[3] 164 U. S. 112.
[4] The decisions on organization have covered many other points than those cited and there have also been additional cases as follows: *In re Bonds of Madera Irrigation District*, 92 Cal. 296; *People* vs. *Perris Irrigation District*, 142 Cal. 601; *Miller* vs. *Perris Irrigation District et al.*, 85 Fed. 693; 92 Fed. 263; *Perris Irrigation District* vs. *Thompson*, 116 Fed. 832; *Tulare Irrigation District* vs. *Shepard*, 185 U. S. 1.
[5] *Turlock Irrigation District* vs. *Williams*, 76 Cal. 360.
[6] *In re Bonds of Madera Irrigation District*, 92 Cal. 296.
[7] *City of San Diego* vs. *Linda Vista Irrigation District et al.*, 108 Cal. 189.
[8] *Boskowitz et al.* vs. *Thompson et al.*, 144 Cal. 724.

BONDS.

As in the case of assessments, the decisions on irrigation district bonds have been so many and in some cases so technical that a full review of them here is not consistent with the purposes of this report. Therefore, only a few of the main questions brought out in the decisions will be referred to. In general, it may be stated that the decisions have covered nearly every phase of the issuance, sale, and redemption of irrigation district bonds, and have necessarily had to do with the validity of district organizations.

In *Cullen* vs. *Glendora Water Company*,[1] decided July 25, 1896, it was held that the language of the Wright act clearly implied that there must be some plan or plans in the alternative before an estimate of costs can be made prior to a bond issue, and that without such plan or plans, no real estimates can be made.[2] In *Hughson* vs. *Crane*[3] it was adjudged that the directors of a district have no authority to appropriate the bonds which the electors have voted to issue for the construction of works to the payment of salaries or to expenditures incurred in the management of the property; also that bonds issued to a contractor in payment for the construction of a dam are issued in violation of the statute and can not, in his hands, be valid obligations against the district. In *Stimson* vs. *Alessandro Irrigation District*,[4] decided January 23, 1902, it was held that the board of directors has power to acquire water works by construction, purchase, or condemnation, and to issue bonds of the district in payment therefor, and that the board has no other powers except those expressly given or implied as necessary to carry out the main purposes of the act. In *Baxter* vs. *Vineland Irrigation District*,[5] decided April 3, 1902, it was held that no question of irregularity such as in keeping the records, conducting the elections, failing to advertise the bonds for sale, etc., can be considered when the bonds are in the hands of *bona fide* purchasers or holders for value, without notice of the alleged irregularities. In *Leeman* vs. *Perris Irrigation District*,[6] decided October 9, 1903, it was held that the board of directors has authority to dispose of bonds by only two modes, all others being excluded by plain implication, and that it can not reasonably be said that the power to exchange bonds for warrants issued for construction work is necessarily implied from the express power to exchange bonds in payment for property; also that one who purchases bonds knowing that they were negotiated in a manner not authorized by law is not a *bona fide* holder. In *Nevada National Bank* vs. *The Board of Supervisors of Kern County*[1] the California court of appeals for the third district decided that it was well established that the proper course to pursue when municipalities refuse to pay their bonds is by an action at law to establish the validity of the bonds and the amount due thereon, and then to apply for a writ of mandate to compel the proper authorities to raise what is required to satisfy the debt by assessment and levy provided by statute.[2] In *Stowell* vs. *Rialto Irrigation District*,[3] decided February 17, 1909, it was adjudged that a contract to deliver bonds for water rights and pipe lines is within the law and that bonds issued from time to time for completed portions of an irrigation system are valid; for by the use of the words (in section 15 of the act of 1897) "works constructed and being constructed" the legislature clearly evidenced its intention to authorize districts to negotiate for water systems in advance of their total completion. In *Harelson* vs. *South San Joaquin Irrigation District*,[4] decided by the state court of appeals of the third district on November 8, 1912, it was held that no time is prescribed within which a petition to have land excluded from a district may be filed, and that although a bond issue may have been authorized, no lien and consequent estoppel of the landowner can arise until the bonds have been sold.

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[1] 113 Cal. 503.

[2] Recent amendments to the act of 1897 which now require a report by the State Engineer as a condition precedent to the calling of bond election are fully referred to in the review of legislation, pp. 48 and 49.

[3] 115 Cal. 404.

[4] 135 Cal. 389.

[5] 136 Cal. 185.

[6] 140 Cal. 540.

In addition to decisions in the state supreme and appellate courts many decisions affecting irrigation district bonds in California have been rendered in the federal courts. In *Miller* vs. *Perris Irrigation District*,[5] decided February 20, 1899, the circuit court for the southern district of California held that bonds issued for "labor and material" are invalid. In *Herring* vs. *Modesto Irrigation District*,[6] decided June 30, 1899, the circuit court for the northern district of California held that the exclusion of lands from a district after organization does not affect an order for a bond issue, provided no bonds have then been sold. In *Thompson* vs. *Perris Irrigation District*[7] the circuit court for the southern district of California held June 11, 1902, that *mandamus* is the proper remedy in the United States circuit court for collecting a judgment obtained therein against a California irrigation district; also that if the directors fail to make a levy for payment of the bonded obligations, it is the duty of the county supervisors so to do and *mandamus* will lie against them therefor.[8]

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[1] 91 Pac. 122.

[2] In this connection it is well to refer to section 39 of the act of 1897 as amended, which makes it under certain circumstances the duty of the district attorney or the attorney general to take appropriate action for enforcing the levying and collection of assessments.

[3] 155 Cal. 215.

[4] 128 Pac. 1010.

[5] 92 Fed. 263.

[6] 95 Fed. 705.

[7] 116 Fed. 769.

[8] In this connection reference is again made to section 39 of the act of 1897.

CONDEMNATION.

This subject was first under consideration by the California supreme court in *Turlock Irrigation District* vs. *Williams*,[1] decided May 31, 1888, which held that the provisions in the Wright act relative to the condemnation of private property were legal and constitutional. In *Rialto Irrigating District* vs. *Brandon*[2] it was held that a right of way may be condemned for a pipe line, as well as for "ditches and canals," for the term "system of works" is broad enough to included pipe lines, flumes, or other conduits for water.

USE OF WATER OUTSIDE OF DISTRICTS.

In *Hewitt* vs. *San Jacinto and Pleasant Valley Irrigation District et al.*,[3] *decided* April 3, 1899, it was held that an irrigation district has power to deliver water on lands outside its own territorial confines if it has purchased the property of a water company subject to this burden, and on no just principle can it hold the property discharged therefrom. A municipal corporation may, for proper corporate purposes, both hold property and perform contracts beyond the municipal boundaries. In *Jenison* vs. *Redfield*,[4] decided July 30, 1906, it was held that the ultimate purpose of an irrigation district is the improvement, by irrigation, of the lands within the district, and this precludes the district from allowing water to be taken outside of the district for the irrigation of other lands, even by a landowner within the district who wishes to use his proportionate share of district water on his own lands outside.

INCLUSION OF UNPATENTED GOVERNMENT LANDS.

In *San Diego* vs. *Linda Vista Irrigation District*,[5] it was held that the legislature has no such power over the public lands of the United States as to subject them to liability for assessments in an irrigation district. In *Nevada National Bank* vs. *Poso Irrigation District*[6] it was held that so long as land remains public land of the United States no liability created by the state or an irrigation district can attach thereto. The sale and conveyance by the United States of land within an irrigation district does not operate to charge it with a pre-existing liability not created or assented to by the government or its grantee, and such land is not a part of an irrigation district, is not subject to any lien for district bonds, and is not subject to any assessment for the payment of any debt or liability of the district.

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[1] 76 Cal. 360.
[2] 103 Cal. 384.
[3] 124 Cal. 186.
[4] 149 Cal. 500.
[5] 108 Cal. 189.
[6] 140 Cal. 344.

In *Cullen* vs. *Glendora Water Company*[1] it was held that the inclusion of unpatented railroad land does not make the organization of the district invalid.

INCLUSION OF MUNICIPALITIES.

In *Modesto Irrigation District* vs. *Tregea,*[2] it was held that municipalities may properly be included within the boundaries of irrigation districts, for they are indirectly and to a certain extent directly benefited by irrigation, as to the merits of which the judgment of the board is conclusive. Furthermore, every taxpayer receives an allotment of the water proportional to his taxes and this he may use or sell, thus receiving a full equivalent for the tax assessed to him. Again, in *In re Madera Irrigation District*[3] it was held that the inclusion of a town neither renders the act unconstitutional nor invalidates the organization of the district.

INCLUSION AND EXCLUSION OF LANDS.

In *Cullen* vs. *Glendora Water Company*[4] it was held that the board of supervisors has discretionary power as to the inclusion or exclusion of lands and that the only objection that can be raised is as to the abuse of such power, or fraud. In *Imperial Water Company No. 1* vs. *Board of Supervisors of Imperial County,*[5] decided January 8, 1912, it was held that the board of supervisors has power to include within the boundaries of a district land not within the boundaries set out in the petition. In *Central Irrigation District* vs. *De Lappe*[6] it was held that the judgment of the board is final as to the exclusion of lands on the basis of their nonirrigability from the proposed common system of works. In *Modesto Irrigation District* vs. *Tregea*[7] it was held that lands may be excluded from a district after the authorization of a bond issue, provided no bonds have been issued or the holders of outstanding bonds consent. In *Harelson* vs. *South San Joaquin Irrigation District,*[8] decided November 8, 1912, the state court of appeals for the third district of California held that the term "another source," as used in section 78 of the act of 1897 (in connection with lands entitled to be excluded from an irrigation district) does not necessarily mean another source of works but may mean any source by which the lands are in fact being irrigated, as for instance, a pumping plant; but in order to counteract this decision section 78 was amended in 1911 by adding a proviso at the end that lands irrigated by underground pumped waters and benefited by subirrigation from the irrigation or drainage works of a district can not claim exclusion, although they are not assessable except for principal and interest on bonds if thus irrigated on organization and still exclusively so irrigated each year. In *Herring* vs. *Modesto Irrigation District*[1] the United States circuit court for the northern district of California held that the exclusion of lands from a district after organization does not affect an order for a bond issue, provided no bonds have then been sold.[2]

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[1] 113 Cal. 503.
[2] 88 Cal. 334.
[3] 92 Cal. 296.
[4] 113 Cal. 503.
[5] 162 Cal. 14.
[6] 79 Cal. 351.
[7] 88 Cal. 334.
[8] 128 Pac. 1010.

EFFECT OF ACT OF 1897 ON DISTRICTS PREVIOUSLY ORGANIZED.

This question has been adjudicated by the federal courts only. In *Herring* vs. *Modesto Irrigation District*,[3] decided June 30, 1899, it was held by the circuit court for the northern district of California that no contract, obligation, lien, or charge incurred by an irrigation district prior to 1897 was affected, impaired, or discharged by any of the provisions of the act of 1897, but such liabilities were expressly continued in section 109 thereof. In *Board of Supervisors of Riverside County* vs. *Thompson*,[4] decided May 11, 1903, it was held by the circuit court of appeals for the ninth circuit on error to the circuit court for the southern district of California that the act of 1897 applies to all existing irrigation districts, no matter when organized, for it recognizes the existence and validity of districts theretofore organized and makes them subject to the provisions of the act so far as applicable.

SUMMARY AND CONCLUSIONS.

1. The original Wright irrigation district act and the amended act of 1897 have together been on the statute books of California for twenty-eight years and during this time, and in spite of many early mistakes and failures, some of which resulted in entire or partial repudiation of bonded indebtedness, the district form of irrigation organization has become an established California institution as to the effectiveness and success of which there can no longer be any question. No irrigation district organized under the amended act of 1897, or since reorganization under that act, has defaulted in the payment when due of either principal or interest of any bonded indebtedness.

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[1] 95 Fed. 705.

[2] For an additional case on inclusion of lands, see *Central Irrigation District* vs. *De Lappe et al.*, 79 Cal. 351.

[3] 95 Fed. 705.

[4] 122 Fed. 860.

2. Failures under the original act of 1887 may, in the main, be attributed to one or more of the following conditions or causes:

(*a*) Lack of any provision for state control or supervision through which the organization of unwise and infeasible districts could be prevented by the state government.

(*b*) The granting of too large a measure of power to minority landowners in the matter of initiating district projects, resulting in the formation of a number of districts in which the majority of the established substantial interests was opposed to such organization; also, resulting in some cases in the formation of districts by a relatively few occupants of desert holdings who in no way represented the interests of those who ultimately would have had to pay for the district improvements had the project been successful.

(*c*) Absence of some proper limitation on the power of districts to create debt without the assent of those representing at least a majority of the property to be charged with the debt. This lack resulted in many cases in the voting and issuance of bonds far in excess of amounts conditions at the time justified, inevitably arousing bitter opposition on the part of the large landowners.

(*d*) In the case of a considerable number of the districts organized, a too strongly speculative attitude on the part both of the promoters and organizers of such districts and of those who purchased the bonds that were issued.

(*e*) Lack of data as to water supply and construction costs, resulting in engineering mistakes that even a small measure of public control should now be able to prevent.

(*f*) In a few cases, willingness of engineers of repute to report favorably on district projects for which there was no physical justification and for which, in some cases, there was no moral justification.

(*g*) Misconception by many of the purposes of the district law and of the extent of the power over riparian rights granted by it to nonriparian owners.

(*h*) Excessive optimism of the period of greatest activity under the law, followed by the industrial panic of 1893, during which feasible projects in some cases met the same fate as those that were not feasible.

(*i*) General attack on the principles of the law under financial support of a number of both large and small landowners who were convinced by shrewd attorneys that the Wright act could be proven unconstitutional and debts incurred under it thereby be invalidated.

(*j*) In some cases, failure of the organizers of districts to give due regard to economic feasibility at the time the projects were undertaken.

3. Forty-nine irrigation districts were organized under the original Wright act. Of these, twenty-four disorganized or were abandoned prior to any substantial activity and without the issuance of any bonds.

One (Walnut) never issued any bonds but has been continuously successful from the start.

4. Of the twenty-four of the old districts that issued bonds, nine were essentially speculative, five were *bona fide* but clearly unwise, one large one was *bona fide* and entirely feasible physically but was unsupported by a sufficient public opinion to justify it at the time organized, four simply failed of success, and seven, including two classed as speculative when organized, are now operating. Sixteen of the twenty-four have effected a financial settlement and bond suits are pending in three others.

5. Of the eight districts organized under the original Wright act that are operating in 1915, Modesto, Turlock, and Alta have most completely made use of the financial and administrative provisions of the district law and are unquestionably successful. Browns Valley and Tulare districts have entirely eliminated their bonded indebtedness, according to the terms of settlement agreed on with their bondholders, and are now operated on a tolls basis with conditions having reached stability in Tulare district. Little Rock Creek district has recently refunded its original bonded indebtedness on a compromise basis and has rehabilitated and greatly improved its water system out of the proceeds of an additional small bond issue. Big Rock Creek district has recently been restarted under the auspices of a socialist colony and settlement suits covering the old bonds are pending. Walnut district continues to run successfully as an agency for the ownership and operation, on a tolls basis, of the small area included.

6. Nine irrigation districts have been organized under the act of 1897 and its amendments.[1] Of these, South San Joaquin, Oakdale, and San Ysidro have mainly completed construction. Imperial has voted the necessary bonds and will take over the system of the California Development Company as soon as certain preliminary uncertainties are cleared up;[2] Anderson-Cottonwood and La Mesa, Lemon Grove, and Spring Valley[3] have laid out or have agreed to purchase works and have voted bonds therefor, and Waterford,[4] Alpaugh,[5] and Black Rock have not yet determined upon procedure for acquiring a water supply and distributing works.

7. The original Wright act of 1887, as re-enacted in 1897 and amended from time to time since then, has proven to be a workable and generally satisfactory measure, the amended law having corrected the chief defects and supplied some of the essential omissions of the earlier law, as well as having added several entirely new features designed to

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[1] This has since been increased to fourteen. See footnote on page 60.
[2] See footnote on page 102.
[3] See footnote on page 94.
[4] See footnote on page 74.
[5] See footnote on page 90.

give the state government a larger responsibility in aiding and watching irrigation districts under the broad theory that irrigation districts are in some measure agencies of the state in furthering irrigation development. It seems quite evident, however, that further improvement is possible, in part as suggested below.

8. The present provision of the California irrigation district act requiring a report by the State Engineer on proposed districts prior to their organization might well be amended to require a careful investigation and physical examination by the State Engineer prior to report, instead of merely requiring a somewhat negative report, as at present; and to make this possible it would seem that the State Engineer should be allowed such reasonable time as he might require, instead of the present thirty days, in which to make his examination and report.

9. Operation of the existing law providing for a report by the irrigation district bond commission on district bond issues has materially strengthened the financial status of approved California irrigation districts and resulted in a definite improvement in irrigation district construction. It is believed, however, that the absence of any control by the state over the expenditure of the proceeds of bond sales where the issuance of the bonds has been approved by the bond commission is unfair both to the state and the investing public, and that consequently the present law should be amended to require approval by the State Engineer of all work done with the proceeds of approved bond issues.

10. The measure of control and supervision that should be exercised by the state over irrigation districts is admittedly subject to argument. In the opinion of the writer, however, the weight of argument, in the case of California, is on the side of strengthening and enlarging the measure of control and supervision now exercised, both as suggested in paragraphs 8 and 9 above, and to give the State Engineer at least advisory jurisdiction over the financial operations of irrigation districts, to the end that efficiency in irrigation districts shall be increased, and the security of bondholders strengthened. In this latter connection it is suggested that the state might well provide an as nearly as possible uniform system of irrigation district accounting, for use especially during construction, but also in connection with operation and maintenance.

11. An annual conference of irrigation district officials to be called by the State Engineer, would, it is believed, work for a more uniform and a better administration of organized irrigation districts, and might lessen the now too frequent amendment of the district law to meet special conditions in particular districts. The connection of the State Engineer with such a conference might inject into its deliberations the viewpoint of the public, which viewpoint has been almost wholly lacking in legislation framed and submitted to the legislature by the districts themselves. Such a conference might, for instance, among numerous

other matters, well consider the wide variation in the levying of irrigation district assessments, to which attention is called in the discussions of the present status of existing districts.

12. The growing tendency in some districts toward employing a competent irrigation district manager who shall, subject to the board of directors, have full control of the district business, seems to be in line with a better business administration, and for that reason is to be strongly commended. There is a feeling in some of the districts that the present per diem system of compensating members of boards of directors for time devoted to district business is responsible for some of the directors giving much time to matters that might more properly be dealt with by a general manager; also that in addition to increasing the cost of administration, by their doing so, the willingness of individual directors to deal with such matters is quite apt to weaken the authority of the engineer or superintendent and thus make his task the more difficult. A remedy for this condition might be found in a board of three, instead of five directors, the members to receive regular annual salaries commensurate with the time devoted by them to district business.

13. The recent great interest in California in the irrigation district form of organization justifies such careful watchfulness by the state as will prevent unduly rapid irrigation district expansion, in advance of real economic justification.

14. The main problem before several of the districts recently organized is to obtain settlers for the lands for which water has been made available, and one of the most prevalent deterrents to rapid settlement would seem to be the high prices asked for land. Unfortunately, no wholly satisfactory method has yet been devised for preventing undue speculation in land in irrigation districts, along with that on projects of other forms, based on the making of irrigation water available. If the experience of the last decade is to profit recently-formed irrigation districts in California, it is believed that the prevention of land speculation, as well as the other problems of modern land settlement, must be given careful consideration by them as districts, instead of leaving such matters wholly to individuals, as in the past. There is no apparent reason why irrigation districts should not and could not enter into agreements with the owners of lands within such districts that are open for colonization providing for the sale of such lands to settlers at an agreed price, and under such conditions and terms of payment as might be mutually determined to be satisfactory to the seller and within the means of the purchaser. An amendment to the district law permitting irrigation districts to enter into such agreements might open to irrigation districts a new way of helping themselves to attain a more rapid development and success.

ADDENDA

I.

STATISTICAL LIST OF IRRIGATION DISTRICTS

Districts organized	County or counties in which located	Year organized	Area, acres (in most cases, approximate)	Bonded indebtedness incurred
Happy Valley	Shasta	1891	----------	None
Orland	Glenn (formerly Colusa)	1887	----------	None
Kraft	Tehama and Glenn (formerly Tehama and Colusa)	1888	13,000	None
Orland South-side.	Glenn (formerly Colusa)	1888	25,000	None
Central	Colusa	1887	156,550	About $570,000
Colusa	Colusa	1888	105,000	None
Browns Valley	Yuba	1888	44,328	$140,000
Modesto	Stanislaus	1887	81,143 (now 81,183)	Original $1,150,000; funding, $1,341,511; and $256,000 additional to Jan. 1, 1915. Later, $610,000. Total now outstanding $1,605,511.

ORGANIZED UNDER THE WRIGHT ACT OF 1887.

Extent of operations	Basis of financial settlement
Accomplished nothing and soon abandoned. Replaced by small cooperative company.	On order of superior court in 1902 supervisors levied assessment sufficient to meet judgment covering all debts left.
Accomplished nothing and soon abandoned.	Left no indebtedness.
Organization and bond issue of $80,000 confirmed, but soon abandoned owing to general discouragement and internal dissensions. Later most of land petitioned out of district.	All indebtedness paid by voluntary assessment.
Made surveys and voted $200,000 bonds, which declared void prior to issue. Abandoned when opposition gained control.	All indebtedness paid by voluntary assessment.
Operated several years, built about 40 miles of canal, ceased work about 1892 due to inability to sell bonds, and finally declared illegally organized by supreme court in 1897. Works leased in 1903, lease now being held by Sacramento Valley Irrigation Company and its successors. Landowners in old district recently held by supreme court to have preferential right to water in Central canal.	Bonds mostly bought by Sacramento Valley Irrigation Company at reported price of 35 cents on dollar and held as protection for lands purchased in district by it. Suits involving validity of bonds never prosecuted to conclusion. Company made compromise with some landowners.
Accomplished nothing and disorganized in 1893 by vote of 208 to 18.	Left no indebtedness.
Built headworks in North Yuba River, 9 miles of flume, 25 miles of main canal, and some laterals, which made water available to about 4,500 acres. Inactive for a number of years due to litigation, but finally declared legal by United States court in 1905. Now operated under contract with power company and by water tolls.	Bonds and interest coupons compromised in 1906 at 30 cents on dollar.
By July 1, 1895, built dam, headworks, 9,000 feet flume and earthworks down to district line. Inactive next 7 years. Rehabilitated 1902, works extended, and now active and successful, 52,381 acres being irrigated in 1914.	Original indebtedness funded in 1902 dollar for dollar less refund of 5 years' interest on funding bonds. All obligations since funding paid in full as due.

STATISTICAL LIST OF IRRIGATION DISTRICTS ORGAN

Districts organized	County or counties in which located	Year organized	Area, acres (in most cases, approximate)	Bonded indebtedness incurred
Turlock	Stanislaus and Merced	1887	176,210 (now 175,566)	Original $1,170,000; funding, $1,156,000; additional to Jan. 1, 1915, $1,416,800; total now outstanding $2,572,800.
Madera	Madera (formerly Fresno)	1888	280,000	None
Sunset	Fresno and Kings	1891	318,500	At least $329,500
Huron	Fresno	1892	25,000	None
Selma	Fresno	1890	200,000	None
Alta	Tulare, Fresno, and Kings.	1888	130,000	Original, $543,000; funding about $480,000.
Tulare	Tulare	1889	39,360	$500,000
Tipton	Tulare	1891	17,000	$50,000

IZED UNDER THE WRIGHT ACT OF 1887—Continued.

Extent of operations	Basis of financial settlement
Construction periodically under way to 1901 and system largely completed. After long litigation bonds finally held valid in 1901 and reorganization and rehabilitation of system rapidly followed. Now active and successful.	Original indebtedness funded in 1902 on basis of 80.5 cents on the dollar. All obligations since funding paid in full as due.
Surveys made and $850,000 bond issue voted. Sought to purchase Madera canal system but unsuccessful. Owing to litigation and discouragement finally voted 166 to 14 to disorganize; dissolved by court April 18, 1896.	All indebtedness paid from time to time by assessments.
Voted $2,000,000 bond issue, made survey; traded $329,500 in bonds for water rights, rights of way, and services. Obtained decree of confirmation by fraud, which finally set aside and district declared null and void.	No settlement made or known to be contemplated.
Accomplished nothing and soon abandoned.	No record of any indebtedness.
Organized to take over existing canals, but three efforts to vote bonds failed and activities practically ceased in 1891 although kept alive and assessments levied for several years thereafter.	Running expenses paid from annual assessments; no debts left unpaid.
Exchanged $410,000 in bonds for '76 Canal and spent $133,000 for laterals. In litigation and other trouble to compromise in 1901, but never inactive. In later years system considerably improved and district now active and successful.	In order to stop litigation against the district and to aid and encourage the district, bondholders consented in 1901 to refund at 25 per cent discount.
Exchanged $250,000 in bonds for Kaweah and Settlers canals, and constructed connecting canal and laterals. Practically inactive and in much litigation 1895 to 1903, but again became active after compromise, and now successful. Now operated mostly by water tolls.	Original indebtedness, not including bond interest, compromised in 1902, mostly at 50 cents on dollar, money being raised by voluntary assessment and subscription.
Contracted for a completed system for practically entire bond issue, and this system, covering the entire area in district, was built. But when diversion of water attempted district permanently enjoined from taking any and district abandoned.	Indebtedness, not including paid interest, compromised in 1911 at average of 72 cents on dollar, money being raised by assessment of about 25 cents on $100 levied by supervisors.

STATISTICAL LIST OF IRRIGATION DISTRICTS ORGAN

Districts organized	County or counties in which located	Year organized	Area, acres (in most cases, approximate)	Bonded indebtedness incurred
Tule River	Tulare	1891	22,000	$100,000
Kern and Tulare	Kern and Tulare	1889	40,000	None
Poso	Kern	1888	40,000	$500,000
Neenach	Los Angeles	1893	3,840	None
Amargoza	Los Angeles	1895	5,000	None
Palmdale	Los Angeles	1890	50,000	None
Manzana	Los Angeles	1891	3,000	About $40,000
Little Rock Creek.	Los Angeles	1892	4,200 (including 1,300 acres government land not properly part of district)	Original, $88,000; later (for funding and reconstruction) $60,000.

IZED UNDER THE WRIGHT ACT OF 1887—Continued.

Extent of operations	Basis of financial settlement
Built dam in Tule River and reconstructed several existing systems, and when ready to distribute water injunction suits brought to restrain diversions by district and injunction granted December, 1898. Water delivered several years, but district soon went in state of stagnation and remained so until compromise. District disorganized January 20, 1913. Works built still in use by landowners.	Indebtedness, not including bond interest, compromised in 1904 at 50 cents on dollar, money being raised by district assessment voluntarily paid. Outstanding warrants, although long outlawed, also paid.
Voted $500,000 in bonds, but none issued. Spent about $40,000 in surveys, rights of way, and other preliminary expenses. Realizing injunction would be brought to prevent diversion from Kern River, voted to disorganize in 1896.	All money spent raised by assessments. After disorganization balance of $900 prorated among taxpayers.
After disposing of $60,000 in bonds contracted for a completed system from Poso Creek for remaining $440,000 voted. After partial completion of an inferior system realized no water available from Poso Creek and district abandoned.	Bonds mostly acquired by an investment company and land being released from bond liability by payment of $11 per acre, 16,715 acres having been so released by November, 1914.
Never active ------------------------------	No record of any indebtedness.
Made surveys, but soon abandoned------	Expenses of organization and surveys paid by those most active.
Voted $175,000 bonds and did a little work looking to diversion from Little Rock Creek. Organization held null and void July 10, 1891, and abandoned. Some little development since by other parties.	No bonds issued. Outstanding warrants never paid.
Part of a land-selling scheme and accomplished nothing because no water available. Bonds traded for alleged water rights and part of a system. Abandoned early.	Several settlements proposed but none yet worked out.
Traded most of bonds disposed of to promoting company for water rights and construction. Little activity 1895 to about 1910 when compromise effected. Works reconstructed 1914-15 at cost of $35,000 in new bonds.	Old bond issue traded 1914 for $25,000 in new bonds.

STATISTICAL LIST OF IRRIGATION DISTRICTS ORGAN

Districts organized	County or counties in which located	Year organized	Area, acres (in most cases, approximate)	Bonded indebtedness incurred
Big Rock Creek	Los Angeles	1890	30,000	In excess of $223,000.
Santa Gertrudes	Los Angeles	1890	2,000	None
Vineland	Los Angeles	1889	4,000	$62,000
Glendora	Los Angeles	1892	3,000	None
Pomona Orange Belt.	Los Angeles	1890	4,000	$2,000
Strong	Los Angeles	1893	900	None
Walnut	Los Angeles	1893	869¾	None
Rialto	San Bernardino	1890	7,200	About $411,000

IZED UNDER THE WRIGHT ACT OF 1887—Continued.

Extent of operations	Basis of financial settlement
Traded $150,000 bonds for water rights and ditch, partly going to promoting company. Additional bonds issued for miscellaneous expenses and additional water development. Abandoned because of no water. Small acreage now being irrigated.	No settlement. Suit on bonds pending November, 1914.
Voted $55,000 bonds, but unable to sell any. Lost water rights while wating. Disorganized September 16, 1899.	Old warrants, long outlawed, paid 50 cents on dollar.
Traded $10,000 for water rights and spent $50,000 in cash and bonds tunneling for water, but were enjoined from using the water developed, but about 100 inches obtained from well in district. Complete default since 1894. About 2,000 acres now being irrigated by small unincorporated company and district abandoned.	No settlement made or known to be contemplated October, 1914. Has about $1,500 still in treasury.
Voted $170,000 bonds, but none issued. District formed to take over Glendora Water Company and obtain additional supply from tunnels. Controversy over agreement followed by litigation in which bonds finally were declared illegal in 1896. Prior to this district abandoned and mutual company formed.	No record of any indebtedness.
Voted $200,000 bonds. Traded the $2,000 issued for water rights, which yielded one-tenth supposed supply. Plans abandoned early, but district not disorganized until 1897. Land now irrigated from wells.	Indebtedness paid in full by voluntary subscription.
Organized chiefly to get power of condemnation. Disputed water rights finally settled favorably and district activity ceased 1898.	Left no indebtedness.
Formed to reorganize and operate an existing ditch system. Has been continuously active and successful.	No settlement necessary; has always paid bills.
Organized to help sell land. Traded bonds disposed of to promoting company for supposed water right and a pipe system to be built. About 75 miles of pipe finally built and about 660 inches of water developed. With dry years water failed, and mutual company formed to operate system.	Over $200,000 of old bonds purchased at 12 to 25 cents on dollar by mutual company now operating system. Numerous suits and appeals on remaining bonds now pending, including appeals on judgments aggregating about $192,000.

STATISTICAL LIST OF IRRIGATION DISTRICTS ORGAN

Districts organized	County or counties in which located	Year organized	Area, acres (in most cases, approximate)	Bonded indebtedness incurred
Olive	San Bernardino	1893	900	None
Citrus Belt	San Bernardino	1890	11,700 (afterwards reduced to 2,450)	None
Grapeland	San Bernardino	1890	10,787	About $129,000
East Riverside	San Bernardino and Riverside.	1890	2,690	About $237,000
Alessandro	Riverside	1891	25,500	$765,000
Elsinore	Riverside	1889	15,000	None
Perris	Riverside	1890	25,000	Probably more than $400,000.
Murrietta	Riverside	1890	14,000	None

IZED UNDER THE WRIGHT ACT OF 1887—Continued.

Extent of operations	Basis of financial settlement
Voted $60,000 bonds to develop artesian water. After confirmation of bonds organizers decided to proceed differently and district disorganized.	Left no indebtedness.
Organized as adjunct to sale of lands. Trusteed $780,000 in bonds to cover development of water by promoting company and on failure of company bonds returned. Built about 1¼ miles ditch with warrants. Disorganized May 1, 1897. About 2,000 acres now watered.	All debts, mostly warrants, paid 50 cents on dollar.
Tapped underflow of Lytle Creek and built 10 to 15 miles of ditches. Organization held valid, but lost supposed water rights and ceased activity. Small area now supplied by development company.	No settlement yet. Suits over bonds pending. One judgment for $4,400 now on appeal to supreme court.
Developed some water from wells, purchased a pipe line for about $100,000 and built other works, mostly paid for in bonds. Reorganized into Riverside Heights Mutual Water Company and over $200,000 spent for betterments. Land all irrigated now.	Mutual company purchased most of bonds at about 25 to 50 cents on dollar. Bonds for $19,000 held invalid in federal court. A few bonds not yet located. Mutual company became responsible for all indebtedness.
Promoted by land and water company, to which it traded all of its bonds for "class B" water rights, the water system to remain the property of the promoting company. Part of the system agreed upon was built, but the company and the water supply both failed and district abandoned. District declared illegal.	No settlement. Bonds held void and bondholders declared to have had notice of illegality of issue. Final judgment acquiesced in by bondholders and bonds burned.
Investigated water supplies and voted $450,000 in bonds to buy "water rights" but abandoned before issuing bonds, owing to doubt as to ability to obtain water, and later dissolved by consent.	All indebtedness paid.
Voted $442,000 in bonds. Traded $240,000 in bonds for "class B" water rights and used nearly $200,000 in bonds in constructing distributing system in district. Promoting company and water supply failed and district abandoned.	In May, 1915, compromised claims on bonds and coupons, partly reduced to judgments, on basis of about 40 cents on dollar. Assumed that no further settlement likely on ground that bonds and coupons not sued on prior to January 1, 1915, have outlawed.
Looked for water in desultory way and bored one well, but was dissolved about five years after organization with nothing accomplished.	All indebtedness paid.

STATISTICAL LIST OF IRRIGATION DISTRICTS ORGAN

Districts organized	County or counties in which located	Year organized	Area, acres (in most cases, approximate)	Bonded indebtedness incurred
San Jacinto and Pleasant Valley.	Riverside	1891	18,000	$225,250
Riverside Heights.	Riverside	1891	1,400	None
Anaheim	Orange	1889	33,000	None
Escondido	San Diego	1889	12,814	$350,000
Fallbrook	San Diego	1891	12,000	None
Linda Vista	San Diego	1891	42,600	$176,000
Jamacha	San Diego	1891	22,000	$111,000
San Marcos	San Diego	1891	10,000	None
Otay	San Diego	1891	44,000	None

IZED UNDER THE WRIGHT ACT OF 1887—Continued.

Extent of operations	Basis of financial settlement
Voted $350,000 in bonds. Traded part for water rights and other property and sold some. Built 3 miles flume, 18 miles main and 12 miles lateral ditches. Irrigated a few hundred acres. Found water and system inadequate and district declared void and abandoned.	No settlement. Some bond claims reduced to judgments, but these not satisfied, and no settlement plan known to be pending. District said to consider itself only liable for about $65,000 of bonds sold for cash.
Voted $300,000 in bonds, but none issued. Spent about $3,000 for general expenses and about $15,000 developing water. Found not feasible and abandoned.	All debts paid before district abandoned.
Voted $600,000 in bonds and proposed to take over and improve local systems, but finally abandoned and dissolved September 12, 1895.	All debts paid before dissolution.
Built dam, tunnels, flumes, and ditches and distributed water to about 1,000 acres. Then changed to mutual company and since operated as such. Dissolved.	Compromised by paying bondholder $200,000 and interest thereon for a few months in full settlement of claims aggregating $498,365 on January 1, 1905.
Voted $400,000 in bonds, but sold none and did nothing beyond preliminary investigation. Declared not legally organized.	No record of having left any indebtedness.
Voted $1,000,000 in bonds. Traded most of those disposed of to the promoters for supposed water properties and paid $10,000 for certain water rights. Dissolved April 15, 1914.	Exchanged water properties originally acquired with $176,000 in bonds for $55,000 of old bonds and compromised remainder of the debt for $125,000 raised by district assessment in 1913 and 1914.
Voted $700,000 in bonds. Purchased Barrett dam site and related water rights for $105,000 in bonds. Adverse conditions resulted in abandonment. Subsequently all property acquired exchanged for all outstanding bonds and warrants and district dissolved May 5, 1909.	All debts paid before dissolution. (See preceding column.)
Voted $350,000 in bonds, but after examination of probable cost was voted to disorganize. Dissolved by court October 4, 1893.	All indebtedness paid before dissolution.
Proposed to utilize Moreno dam site, but got into litigation and abandoned. Incurred expenses to amount of about $6,000. Levied one assessment of $9,000, but this held invalid. Voted to dissolve in 1894, but dissolution not allowed because of outstanding debts.	No settlement. All debts outlawed.

II.

LIST OF IRRIGATION DISTRICTS, PROPOSED UNDER THE ORIGINAL WRIGHT ACT, FOR WHICH ORGANIZATION WAS NEVER COMPLETED.

Records of the old Wright act districts disclose a number of attempts to form districts that were not successful. In some cases the petitions to the supervisors were denied; in other cases they were withdrawn. In at least one case there has been merely a confusion of names. As some of these proposed districts have occasionally been referred to as districts that were fully organized, a list of them, together with statements of essential facts regarding them, is included herewith:

Spring Valley (San Diego County).—This was merely the name originally proposed for Jamacha district.

Oceanside Coast (San Diego County).—Petition filed September 12, 1891; denied October 5, 1891.

Azusa (Los Angeles County).—Petitions filed April 1, 1889, June 10, 1889, and at one later time. At one election on the proposal to organize 181 voted "Yes" and 111 "No." Plan definitely abandoned July 28, 1890.

Downey (Los Angeles County).—Petition filed January 5, 1888. Remonstrance filed January 20, 1888. Dropped.

Alhambra (Los Angeles County).—Petition filed August 3, 1889. Approved by supervisors but withdrawn at request of petitioners.

Acton (Los Angeles County).—Petition filed December 26, 1892. Protest filed saying project would bond lands included for one-half of their value and that the promoters would get the benefit. Petition dismissed April 19, 1893.

Delhesa (Los Angeles County).—Petition filed March 9, 1891; denied April 3, 1891.

Willows (Colusa County).—Petition filed December 8, 1887. Organization defeated at election January 14, 1888, vote standing 88 for and 48 against. As originally proposed this district included some land in Orland Southside district but this was excluded prior to the election.

College (Colusa County).—Petition filed May 7, 1888. Organization defeated by vote of 74 to 43 at election held June 18, 1888. Covered land near College City southeast of Colusa, water to be taken from Sacramento River.

Pierce (Colusa County).—Petition filed August 6, 1888. Covered land south of Willows. Organization defeated September 8, 1888, by vote of 61 to 34.

Kirkwood (Tehama County).—Petition filed December 24, 1889. Water for district to be obtained from Toms Creek. Organization defeated by vote of 20 to 39 January 20, 1890.

III.

LIST OF IRRIGATION DISTRICT CASES AFFECTING CALIFORNIA IRRIGATION DISTRICTS AND SUBJECTS DEALT WITH IN DECISIONS.

Turlock Irrigation District vs. **Williams,** 76 Cal. 360, May 31, 1888: Constitutionality; public nature of irrigation districts; assessments; condemnation.

Central Irrigation District vs. **De Lappe et al.,** 79 Cal. 351, May 31, 1889: Bonds; constitutionality; public nature of irrigation districts; organization; construction of law; petition; sufficiency of bond; meeting of board; publication of petition; establishment of boundaries; publication of election proclamation; establishment of voting precincts; form of bonds.

Crall vs. **Board of Directors of Poso Irrigation District,** 87 Cal. 140, December 15, 1890: Constitutionality; public nature of irrigation districts; bonds; confirmation proceedings; jurisdiction of court therein; service of process.

Board of Directors of Modesto Irrigation District vs. **Tregea,** 88 Cal. 334, March 19, 1891: Bonds; confirmation proceedings; publication of notice of petition; contents of notice; jurisdiction of court after amending petition; inclusion of city lands; sale of allotted water; judgment of board on inclusion; materiality of evidence of fraud; exclusion of lands; reintroduction of evidence; notice of election; time of commencing proceeding; effect of exclusion on subsequent bonds.

Palmdale Irrigation District et al. vs. **Rathke et al.,** 91 Cal. 538, October 14, 1891: Bonds; confirmation proceedings; appeal; notice of entry of judgment; estoppel by stipulation.

In re Bonds of Madera Irrigation District, 92 Cal. 296, December 14, 1891: Constitutionality; public use; organization of public corporations; public nature of irrigation districts; taxation; assessments for local improvements; sufficiency of bond accompanying petition; sufficiency of boundary description; proof of presentation of petition; form of bonds; inclusion of municipality.

People vs. **Turnbull,** 93 Cal. 630, March 17, 1892: Attempted bribery; scope of ''Trustee'' in Penal Code; allegation of *quasi* public nature of corporation.

Tregea vs. **Owens,** 94 Cal. 317, April 11, 1892: Assessment; taxation; authorization of assessment by electors.

People vs. **Selma Irrigation District,** 98 Cal. 206, May 4, 1893: Public nature of irrigation districts; dissolution for nonuser of franchise.

Sanford vs. **East Riverside Irrigation District,** 101 Cal. 275, February 7, 1894: Contract; damages; findings on conflicting evidence; ascertainment of profit.

Quint vs. **McMullen,** 103 Cal. 381, July 20, 1894: Quieting title; delinquent tax sale; erroneous decree; status of ownership. .

Rialto Irrigating District vs. **Brandon et al.,** 103 Cal. 384, July 20, 1894: Condemnation; authority to construct pipe line; confirmation proceeding.

Quint vs. **Hoffman et al.,** 103 Cal. 506, August 8, 1894: Assessments; *de jure* or *de facto* character of district; collateral attack on validity of organization; payment of just tax.

Woodruff et al. vs. **Perry et al.,** 103 Cal. 611, August 25, 1894: Assessment; authorization by electors.

Directors of Fallbrook Irrigation District vs. **Abila,** 106 Cal. 355, 365, March 11, 1895: Confirmation proceedings; qualifications of signers of petition for organization; tenant in common; married woman holding community property as signer; holder of certificate of purchase from state for school land partly paid for as signer; issues in new trial; time of opening and closing polls; burden of proof in confirmation proceedings; bonds; entry on minutes of board; rescission of resolution for bond issue.

First National Bank of Bridgeport, Ohio, vs. **Perris Irrigation District et al.,** 107 Cal. 55, April 5, 1895: Notice by materialman; assignment by contractor; rights of *bona fide* assignee; voidability of executed contract; filing of notice of claim; entirety of contract; value of patterns; counterclaim; setoff.

City of San Diego vs. **Linda Vista Irrigation District et al.,** 108 Cal. 189, July 19, 1895: Assessment and taxation; pueblo lands of city; state lands; government lands.

Fudickar vs. **East Riverside Irrigation District,** 109 Cal. 29, September 5, 1895: Allegation of ownership; real property character of water right; president of corporation as grantor and grantee; voidability of unauthorized conveyance; enforcement of voidable contract against assignee.

Cooper vs. **Miller et al.,** 113 Cal. 238, June 6, 1896: Assessment; sale; assessment of several lots in one parcel; double levy in one order; tax deed as evidence of election; recital of election in order of board; materiality of allegation of payment.

Cullen et al. vs. **The Glendora Water Company,** 113 Cal. 503, July 25, 1896: Confirmation proceedings; plans and estimates; constitutionality of act of 1889; sufficiency of boundary description; inclusion and exclusion of land; divisions in district; election of directors; fraud in organization; inclusion of railroad lands.

Hughson et al. vs. **Crane**, 115 Cal. 404, December 18, 1896: Bonds; assessments; discretion of board in making levy; *bona fides* of bondholders; district as party in action to vacate assessment.

Boehmer vs. **Big Rock Irrigation District et al.**, 117 Cal. 19, May 14, 1897: Proof of ownership; riparian rights; percolating waters; procedure for new trial; right of district to sue and be sued.

Wilson et al. vs. **Carter,** 117 Cal. 53, May 21, 1897: Assessment; sale; liability of former collector.

In re Organization and Bonds of the Central Irrigation District, 117 Cal. 382, June 24, 1897: Confirmation act; special proceeding; weight of prior decision; finality of supervisors' decision; constitutionality; publication of notice of presenting petition; freeholders; owners of town lots as petitioners; bonds; rights of *bona fide* bondholders.

Carter vs. **Tilghman,** 119 Cal. 104, November 24, 1897: Warrants, assessments; division into funds.

Mitchell vs. **Patterson,** 120 Cal. 286, March 15, 1898: Warrants; clerical errors in findings; statutory funds of district; liability for salaries and expenses.

Lahman et al. vs. **Hatch,** 124 Cal. 1, March 9, 1899: Assessments; description in assessment book; alterations by board of equalization; constitutionality; notice of levy.

Hewitt et al. vs. **San Jacinto and Pleasant Valley Irrigation District et al.**, 124 Cal. 186, April 3, 1899: Water rights; delivery of water; usage in community; proof of land ownership; assumption of contracts by district; delivery of water outside district; introduction of evidence; damages to crops.

People ex rel. Stone vs. **Jefferds et al.**, 126 Cal. 296, October 12, 1899: Dismissal of action; laches of irrigation district; discretion of judge.

East Riverside Irrigation District vs. **Holcomb et al.**, 126 Cal. 315, October 18, 1899: Proper parties; intervention; cross-complaint on new cause of action.

Vineland Irrigation District vs. **Azusa Irrigating Company et al.**, 126 Cal. 486, October 28, 1899: Appropriation of water; notice of appropriation; surface flow; subterranean flow; ''percolating waters'' defined; change of point of diversion.

Perry vs. **Otay Irrigation District et al.**, 127 Cal. 565, February 15, 1900: Public character of district officers; assessments; set-off of salary; public funds; illegality of collection.

People vs. **Linda Vista Irrigation District,** 128 Cal. 477, May 3, 1900: Confirmatory act; purpose of special proceeding; constitutionality of confirmatory act; scope of judgment in special proceeding; bar to subsequent *quo warranto;* public nature of irrigation districts.

Sechrist et al. vs. **Rialto Irrigation District et al.**, 129 Cal. 640, September 5, 1900: Demurrers; bonds; statute of limitations; laches; relief of taxpayer without first doing equity; district as plaintiff and defendant; proper and necessary parties.

Escondido High School District of San Diego County vs. **Escondido Seminary of University of Southern California et al.**, 130 Cal. 128, September 27, 1900: Assessments; misnomer of owner of property assessed; conclusiveness of tax deed; discretion of board of directors in making levy; contents of tax deed; constitutionality.

Kerr vs. **Superior Court**, 130 Cal. 183, October 2, 1900: Mandamus; review of action of court; citation; discretion of court; undertaking of fruitless thing.

People ex rel. Fogg vs. **Perris Irrigation District**, 132 Cal. 289, March 21, 1901: Rights of intervenors on appeal; confirmation proceedings; impeachment of confirmation judgments.

Stimson vs. **Alessandro Irrigation District**, 135 Cal. 389, January 23, 1902: Powers of boards of directors; bonds delivered for executory contract; jurisdiction of court in special proceeding.

Baxter vs. **Vineland Irrigation District et al.**, 136 Cal. 185, April 3, 1902: Bondholders as proper parties; collateral attack on bonds; rights of *bona fide* holders; assessments; acts of *de facto* officer; sale noticed for legal holiday; proof of allegations in complaint.

Nevada National Bank of San Francisco vs. **Poso Irrigation District**, 140 Cal. 344, September 25, 1903: Government lands; liability of patented land on bonds previously issued; inclusion of patented land.

Henry et al. vs. **Vineland Irrigation District et al.**, 140 Cal. 376, September 28, 1903: Assessments; dismissal of action; effect on intervenor.

Leeman vs. **Perris Irrigation District**, 140 Cal. 540, October 9, 1903: Bonds: authority of board to dispose of bonds; *bona fides* of holder.

Turpen vs. **Turlock Irrigation District et al.**, 141 Cal. 1, October 17, 1903: Condemnation; damage from seepage; reasonableness of construction work.

People vs. **Perris Irrigation District**, 142 Cal. 601, March 26, 1904: Notice of appeal; statute of limitations; fraud; special proceeding; effect of special proceeding on validity of organization; cause for action in equity.

Merchants' National Bank of San Diego vs. **Escondido Irrigation District**, 144 Cal. 329, August 3, 1904: Pledge of district property; constitutionality; public and private nature of irrigation districts.

Boskowitz et al. vs. **Thompson et al.**, 144 Cal. 724, September 20, 1904: Rights of intervenors; liens; assessments; judicial power to declare and enforce liens; discretion of board of directors.

Best vs. **Wohlford et al.**, 144 Cal. 733, September 20, 1904: Tax-deed assessment; description of land assessed; parol evidence on description; reference to map.

Jenison vs. **Redfield et al.**, 149 Cal. 500, July 30, 1906: Ownership of proportionate share of district water; use of water outside district; damages; prescriptive right of landowner against district.

Western Union Telegraph Company vs. **Modesto Irrigation Company et al.**, 149 Cal. 662, August 31, 1906: Assessments; real property; personal property; telegraph lines.

Best vs. **Wohlford et al.**, 153 Cal. 17, February 8, 1908: Assessments; tax deed; sufficiency of description of land; least quantity of land; time when entitled to deed; abbreviations in notice of sale; statement of separate assessments.

Fogg vs. **Perris Irrigation District**, 154 Cal. 209, August 28, 1908: Notice and petition; fraud in organization; voidability of organization; decree of confirmation; contents of notice of hearing; changes in boundaries; bonds; effect of invalid and valid decrees.

De La Beckwith vs. **Sheldon et al.**, 154 Cal. 393, October 13, 1908: Appropriation; lease from district; contract; confidential relations of contractors; place of diversion; prosecution of work under notice of appropriation; admissibility of evidence; magnitude of enterprise; lapse of district's rights; proper parties.

Tulare Irrigation District et al. vs. **Collins**, 154 Cal. 440, October 20, 1908: Execution sale; public trust; estoppel of district.

Stowell vs. **Rialto Irrigation District**, 155 Cal. 215, February 17, 1909: Contract to deliver bonds; purposes of bond exchange; form of bonds; negotiability.

Chinn et al. vs. **Superior Court of San Joaquin County**, 156 Cal. 478, November 19, 1909: Judicial power of courts; appeals from board of supervisors; constitutionality.

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De La Beckwith vs. **Sheldon et al.**, 165 Cal. 319, April 16, 1913: Novation; substitution of contract; revival of canceled contract; effect of new contract; effect of intervening rights.

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De La Beckwith vs. **Sheldon**, 168 Cal. 742, December 10, 1914: Construction of contract; allegation of value of bonds; lien on property of company.

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Hewel vs. **Hogin**, 84 Pac. 1002, November 17, 1905; March 15, 1906: Permission to amend; lithographic signature; funds for payment of bonds; *mandamus;* interest on interest coupons; statute of limitations.

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Bradley et al. vs. **Fallbrook Irrigation District et al.**, 68 Fed. 948, July 22, 1895: Relief in equity; constitutionality; public use; due process of law.

Miller vs. **Perris Irrigation District et al.**, 85 Fed. 693, February 21, 1898: Corporate existence; challenge by private parties; effect of state decisions on federal courts; conclusiveness of confirmation decrees; statutory bar to attack on illegality of organization; accrual of cause of action.

Alessandro Irrigation District vs. **Savings and Trust Company of Cleveland, Ohio, et al.**, 88 Fed. 928, June 29, 1898: Bonds; cross bill.

Perris Irrigation District vs. **Savings and Trust Company of Cleveland, Ohio, et al.**, 88 Fed. 989, June 29, 1898: Bonds; cross bill.

Miller vs. **Perris Irrigation District et al.**, 92 Fed. 263, February 20, 1899: Bonds; labor and material; innocent purchasers; pleadings; consideration; attack on organization; restoration of consideration.

Shepard vs. **Tulare Irrigation District**, 94 Fed. 1, April 24, 1899: *Mandamus;* federal jurisdiction; bond fund; demand on county treasurer; allegations of regularity in issuance.

Herring vs. **Modesto Irrigation District**, 95 Fed. 705, June 30, 1899: Allegation of failure to perform duty; jurisdiction of federal courts; *mandamus;* constitutionality; decisions of California courts; corporate character of district; estoppel of district to plead illegal organization; construction of statute of limitations; discretion of supervisors; effect of exclusion of lands on bonds.

Miller vs. **Perris Irrigation District et al.**, 99 Fed. 143, January 15, 1900: Estoppel of municipality; rights of *bona fide* bondholders; duty of directors; binding force of judgment in special proceeding; effect of *quo warranto* on bonds.

Perris Irrigation District vs. **Thompson**, 116 Fed. 832, May 5, 1902: Relief of bondholder; purport of confirmation proceedings; bonds as evidence of corporate character; president of district as bondholder.

Thompson vs. **Perris Irrigation District**, 116 Fed. 769, June 11, 1902: *Mandamus;* duty of supervisors; remedy of bondholders.

People ex rel. Brady vs. **Browns Valley Irrigation District et al.**, 119 Fed. 535, November 3, 1902: *Quo warranto;* constitutionality.

Board of Supervisors of Riverside County et al. vs. **Thompson et al.,** 122 Fed. 860, May 11, 1903: Levy by supervisors; *res adjudicata; mandamus:* notice to supervisors; effect of act of 1897 on districts previously organized; competency of petition to supervisors as evidence.

Marra vs. **San Jacinto and Pleasant Valley Irrigation District et al.,** 131 Fed. 780, April 27, 1904: Receivership; remedy on bonds; *mandamus.*

Wright vs. **East Riverside Irrigation District,** 138 Fed. 313, May 29, 1905: *Bona fide* bondholders; signatures to bonds; signatures to coupons; antedating.

Quinton et al. vs. **Equitable Investment Company et al.,** 196 Fed. 314, May 6, 1912: Relief in equity; vacancies in office; powers of taxpayers; collateral attack on organization.

Perris Irrigation District vs. **Turnbull,** 215 Fed. 562, May 4, 1914: Issuance of summons; following state procedure.

Perris Irrigation District vs. **Escher et al.,** 215 Fed. 566, May 4, 1914: Issuance of summons; following state procedure.

Fallbrook Irrigation District vs. **Bradley,** 164 U. S. 112, November 16, 1896: Constitutionality; authority of state courts; due process of law; public use; hearing before supervisors; public nature of irrigation districts; assessments.

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Tulare Irrigation District vs. **Shepard,** 185 U. S. 1, March 24, 1902: Notice and petition; corporate character of district; rights of *bona fide* bondholders; recital in bonds; determination of board of supervisors.

IV.

OUTLINE OF CALIFORNIA IRRIGATION DISTRICT ACT OF 1897 AS AMENDED TO 1915.

(For substance of supplemental acts and constitutional amendments, *see* discussion in main text on "Irrigation District Legislation Since the Act of 1897," p. 47.)

ORGANIZATION.

Who may sign organization petition.

SECTION 1. A majority in number of holders of title or evidence of title, including holders of possessory rights, to lands susceptible of irrigation from a common source and by the same system of works, representing majority in value of said lands, may propose the organization of an irrigation district. Such lands need not consist of contiguous parcels. Owners of undivided interests may sign for such interest and each such owner shall be considered as one assessment payer. Guardians, executors, administrators, or other persons holding property in a trust capacity under appointment of court may sign any petition provided for in the act, when authorized to do so by order of court.

Hearing on petition; report by State Engineer.

SEC. 2. Petition to be filed with supervisors and to set forth generally proposed boundaries and proposed water source or sources. Must be accompanied by undertaking, to be approved by supervisors, in double amount of probable cost of organizing and be presented at regular meeting, and also be published in some newspaper of general circulation printed and published in county where presented, together with notice stating time of meeting at which petition is to be considered. On or before day petition is presented to supervisors, copy thereof to be filed with State Engineer. Supervisors to determine sufficiency and regularity of petition within two weeks. If necessary legal requirements not complied with in petition, matter to be dismissed without prejudice. If supervisors determine that all requirements have been complied with in petition, copy of resolution so declaring to be forwarded to State Engineer, and further hearing postponed not exceeding one month in all. Upon receiving copy of resolution State Engineer to make such investigation as may be practicable, with view to determining whether any condition or conditions exist that would justify him in reporting against organization. State Engineer to report in writing within one month. If he reports that proposed project is not feasible, hearing of petition by supervisors shall again be continued, not exceeding one month, and petition shall then be dismissed, unless supervisors be requested in writing by three-fourths of holders of title or evidence of title to grant it; *provided*, that supervisors may modify proposed plans in accordance with recommendations of State Engineer. Failure of State Engineer to report, however, shall not invalidate organization of any district. On final hearing supervisors shall make any changes in proposed boundaries that are deemed advisable, but shall not exclude any land susceptible of irrigation from any of the sources proposed, nor include any lands which will not be benefited by irrigation from the proposed system of works. Any person whose lands are susceptible of irrigation from proposed sources may, in discretion of supervisors, be included.

Final hearing by supervisors.

SEC. 3. Upon final hearing supervisors reaffirm conclusions as to sufficiency of petition. Only new evidence against sufficiency to be heard.

SEC. 4. Finding in favor of sufficiency final against all except state of California, and suit by state must be brought within one year.

Divisions and representation for directors.

SEC. 5. At final hearing supervisors divide district into three or five divisions, as determined by petition. One director to represent each division and reside therein, but may be elected by divisions or at large, as provided in petition.

Election on organization.

SEC. 6. Notice of election on organization given by supervisors and published three weeks. Supervisors also establish election precincts. Election to be conducted as nearly as practicable in accordance with general election laws.

Officers to be elected.

SEC. 7. At organization election there shall be elected directors, assessor, tax collector, and treasurer. If petition so requests certain offices may be consolidated.

Qualifications of electors.

SEC. 8. No person shall be entitled to vote at any election held under the provisions of this act who does not possess all of the qualifications required of electors under the general election laws of the state.

Canvass of vote; filing order; contests.

SEC. 9. Supervisors canvass vote on second Monday succeeding organization election. Two-thirds vote required to carry organization. Candidates for offices receiving highest number of votes are elected.

SEC. 10. Supervisors file order on organization and election officers, after which organization complete. Thereafter, no lands embraced in district can be included in another district without consent of directors.

SEC. 11. Organization election may be contested in superior court within twenty days after canvass of vote. Appeal may be taken within thirty days from judgment and must be decided by supreme court within sixty days.

SEC. 12. Officers elected immediately enter on duties.

Organization of directors.

SEC. 13. On first Tuesday after election directors classify themselves by lot and two or three (depending on whether three or five elected) serve until next, and the others until the second, general February election. Elect president from their number and appoint secretary, each to serve during pleasure of directors. Directors fix salary and bond of secretary.

MANAGEMENT.

Meetings of directors; financial statement.

SEC. 14. Directors to hold regular monthly meetings at their office at time fixed by resolution. Time can not be changed for twelve months and then only two months after resolution ordering change and after publication of notice. Directors may hold special meetings. All meetings of directors and all records open to public. Majority of directors constitute quorum. At regular meeting in January of each year directors shall render and thereafter publish verified financial statement. Whenever act specifies first Tuesday in month for transaction of any business, regular monthly meeting may be substituted; and when regular monthly meeting is other than first Tuesday, new boards of directors shall organize at first regular meeting in March.

Powers of officers; limitations on indebtedness; by-laws; rules and regulations.

SEC. 15. Directors manage business affairs of district, make necessary contracts, employ agents, officers, and employees, and prescribe their duties. Directors and their employees may enter any land and make surveys; acquire by purchase, lease, or condemnation necessary rights and properties including canals and works constructed and being constructed, and stock of other corporations owning water properties; but no purchase in excess of ten thousand dollars can be made without prior petition by majority of owners representing majority in value of lands in district. Directors may also construct necessary works and perform any necessary lawful act that sufficient water may be furnished, take conveyances or contracts for property acquired, institute and maintain necessary actions, sue and be sued. Directors shall establish and print by-laws and rules and regulations. Shall have power generally to perform all necessary acts.

Change of boundaries of divisions and precincts; lease of works.

SEC. 15½. Directors may change boundaries of divisions and election precincts, but not less than sixty days prior to an election. May also lease works of district, or any part thereof, but only after prior publication for three weeks of intention to lease, and only to highest bidder, from whom bond shall be required.

Condemnation.

SEC. 16. Suits for condemnation to be brought under title seven, part three, Code of Civil Procedure.

USE OF WATER.

Public use.

SEC. 17. Use of water for irrigation of lands within any district and for domestic and other incidental beneficial uses within district, and rights of way necessary declared a public use subject to regulation and control of state.

Prorating of water.

SEC. 18. All waters distributed for irrigation purposes to be prorated to landowners on basis of assessments for district purposes; and any landowner may assign whole or portion of his apportionment.

GENERAL ELECTIONS.

Time; officers to be elected; bonds; special elections when default in general election; organization of board; term of office.

SEC. 19. General elections to be held on first Wednesday in February each second year after 1899, and assessor, collector, treasurer, and directors elected. Assessor, collector, and treasurer to hold office for two years. Assessor to execute bond for five thousand dollars, collector for not more than twenty thousand or less than five thousand dollars, treasurer for not more than fifty thousand or less than ten thousand dollars, and directors for five thousand dollars each. Where district appointed fiscal agent of United States additional bonds may be required by secretary of interior. If general election not held as provided, special election shall be called on petition of ten per cent of resident electors.

SEC. 20. Directors organize on first Tuesday in March following election. Term of office of directors is four years.

Notice and conduct of general elections; nominations; vacancies; qualifications of directors; consolidation of offices; number of directors and representation; recall.

SEC. 21. Notice of general election to be posted fifteen days prior to election. Directors to appoint election officers.

SEC. 22. Inspector is chairman of election board and may administer oaths, etc. Polls open 8 a.m. to 4 p.m.

SEC. 22*a*. Ballots to be provided by directors; form of ballot; voting.

SEC. 22*b*. Not less than ten days before an election ten or more electors may make nominations by petition.

SEC. 23. Voting conducted as nearly as practicable according to general election laws; counting of ballots; returns of election; recount.

SEC. 24. Directors publicly canvass election returns first Monday after election and declare result.

SEC. 25. Secretary records election returns, directors declare result, and secretary issues election certificates. In case of vacancy in office of assessor, collector, or treasurer, directors appoint, and if directors fail to fill vacancy within forty days, supervisors shall. In case of vacancy in board of directors, supervisors appoint. All officers appointed to fill vacancies serve until next regular election.

SEC. 26. A director shall be a resident and a freeholder of the district.

SEC. 27. Directors may consolidate or segregate offices of assessor, collector, and treasurer, provided consolidation or segregation is made thirty days prior to general election.

SEC. 28. On petition by a majority of owners, directors may order that at ensuing election either three or five directors shall be elected, and that they shall be elected by divisions or at large, but directors elected at large must nevertheless represent separate divisions and reside therein.

SEC. 28½. Any elective officer can be recalled at any time, recall petition to be signed by twenty-five per cent of highest vote cast for candidates at last general district election, and if elected by division, by twenty-five per cent therein. If petition sufficient, election called for between thirty-five and forty days later, or at general election if one to occur within between thirty-five and sixty days. Nominations of candidates for recall elections to be made as other nominations. Vote for candidate not counted unless voter voted on recall. Majority vote determines result. Procedure identical with that in regular election. If recall unsuccessful no further petition allowed within six months.

TITLE TO AND SALE OF PROPERTY.

SEC. 29. Title to all property acquired by district shall vest in district and be held in trust for it and is dedicated to the uses and purposes set forth in the act. Directors authorized to hold, use, acquire, manage, occupy, and possess such property, and may sell property no longer necessary.

ISSUANCE OF BONDS.

Estimate by directors; report by State Engineer; vote; form and term of bonds; interest rate; sale of bonds; price.

SEC. 30. Directors estimate and determine amount of money necessary to be raised and for that purpose shall make all needed surveys and plans under direction of competent irrigation engineer. Copy of engineer's report to be sent to State Engineer, who shall examine and make further examinations necessary and report to directors within ninety days, giving his conclusions as to the supply of water available and the feasibility of the project. Directors then, when petitioned by majority of owners, representing majority in value of lands, shall call election on bond issue. Notice of election must be given for twenty days. Election to be held as nearly as practicable in conformity with provisions governing election of officers. Alternative questions as to issuance of bonds may be submitted separately on same ballot. Majority vote required to carry bonds.

SEC. 31. Bonds payable in twenty series—two per cent at end of twenty-one years and twenty-two years; three per cent at end of twenty-three years and twenty-four years; four per cent at the end of twenty-five years, twenty-six years, twenty-seven years, and twenty-eight years; five per cent at the end of twenty-nine years, thirty years, thirty-one years, and thirty-two years; six per cent at the end of thirty-three years, thirty-four years, thirty-five years, and thirty-six years; seven per cent at the end of thirty-seven years and thirty-eight years; eight per cent at the end of thirty-nine years and forty years; provided that if so specified in petition, bonds may be in less than twenty series and be payable at end of shorter periods. Bonds bear interest at not to exceed six per cent, payable January 1 and July 1. Denomination not less than one hundred nor more than one thousand dollars, and bonds are negotiable.

SEC. 32. Directors may sell bonds as necessary but only after resolution and advertisement, and must go to highest bidder, or any or all bids may be rejected.

SEC. 32½. Bonds authorized before amendment of 1913 removing par limit but not sold may be sold for less than par if approved at special election by two-thirds vote.

Payment of bonds.

SEC. 33. Bonds and interest thereon to be paid from annual assessments on real property of district, and all such real property liable to assessment for such purpose. (*See* exemption of improvements, section 35.)

Special assessment to complete works if funds insufficient.

SEC. 34. If money raised from bond sales be insufficient for completing works, and more bonds not voted, directors shall levy assessment for such purpose if approved by majority vote at a special election.

ASSESSMENTS.

Duties of assessors; deputy assessors; equalization; levy and collection; lien.

SEC. 35. Assessment of all real estate in district to be made between first Monday in March and first Monday in June at full cash value, except that improvements, including trees, vines, alfalfa, and all growing crops and all buildings and structures erected or being erected, are exempted. In districts organized prior to amendment exempting improvements, improvements may be exempted at special election by vote of majority of resident owners of land subject to taxation therein.

SEC. 36. Assessor shall be allowed necessary deputy assessors at not to exceed five dollars per day.

SECS. 37 and 38. Assessor must deliver completed assessment book to secretary on or before first Monday in August, who shall give notice of equalization, to be made within between twenty and thirty days. Equalization shall be made by directors during session of not to exceed ten days, and within ten days thereafter secretary must have roll corrected and totaled.

SEC. 39. Within fifteen days after equalization directors shall levy assessment to cover interest and principal due on bonds, rentals or charges due or to come due during year on leases or contracts, and amount due on any obligation reduced to judgment. If directors fail to make assessments and levies, county assessment shall be used and supervisors shall make levy at expense of district. On failure of district collector or treasurer to act, county tax collector and assessor shall do so. Is duty of district attorney to ascertain each year whether necessary assessments have been levied and collected, and if there has been neglect or refusal by district officers, district attorney shall notify county officers authorized to act and upon their failure to act within thirty days shall take appropriate action in court to compel performance. For enforcement of levy and collection of assessment levied after adoption of amendment so providing, and to pay debt incurred after adoption of such amendment, attorney general of state shall take appropriate action on failure of district and county officers to act. All powers and duties respecting collection of assessments provided in sections 3820, 3821, 3822, 3823, 3824, 3825, and 3829 of the Political Code, as regards county assessors, shall apply as far as applicable to irrigation district assessors.

SEC. 40. Unpaid assessments become a lien after first Monday in March (*see* Stats. 1913, chap. 274, p. 415, relating to collection of assessments in two installments) and lien for bonds of any issue shall be a preferred lien to that for any subsequent issue.

Delinquencies; penalties; publication of delinquent notice sale.

SEC. 41. On or before November first assessment book delivered to collector and within twenty days collector must give notice that assessments are due and will become delinquent at 6 p.m. on last Monday in December. (*See* Stats. 1913, chap. 274, p. 415, relating to collection of assessments in two installments.) Ten per cent penalty added if not paid within time specified.

SEC. 41*a*. In lieu of selling property on delinquent list directors may direct collector to sue delinquent for amount due, in accordance with Code of Civil Procedure.

SEC. 42. Collector must publish delinquent list on or before February first, and time of sale specified in notice must be not less than twenty-one nor more than twenty-eight days from first publication.

SEC. 43. In addition to principal and ten per cent penalty, collector must collect fifty cents on each tract separately assessed and sale must be completed within three weeks.

SEC. 44. In case there is no purchaser in good faith for property offered for sale, whole amount of property assessed shall be struck off to district.

SEC. 45. Collector shall issue certificates of sale, in duplicate, one copy to be given to purchaser and one copy to be filed in office of county recorder.

SEC. 46. Secretary must enter in his records a description of land sold and on filing of certificate with county recorder, lien of assessments vests with purchaser and is only divested by payment of purchase price and two per cent per month from date of sale until redemption.

Redemption of property sold for delinquent assessments; effect on dissolution; deed; misnomer.

SEC. 47. Redemption may be made by owner or any party in interest within five years, or at any time thereafter before deed has been delivered. County recorder must file certificates of sale. If property not redeemed collector must, on demand, issue deed, subject to fee of two dollars.

SEC. 47½. Redemption period shall not bar dissolution of a district, and in any district that has been dissolved or is in process of dissolution, if land has been sold for delinquent taxes and redemption period has not expired, owner or any one in interest may redeem it. After dissolution, deed to unredeemed property shall be issued by county treasurer.

SEC. 48. Prescribes form of deed. When duly acknowledged or proved deed is, except against fraud, conclusive evidence of regularity of previous proceedings, and deed conveys absolute title, except that it is *prima facie* evidence of right of possession in case of lands owned by United States or state.

SEC. 49. Assessment book or delinquent list or copy thereof certified by collector, is *prima facie* evidence of facts and compliance with law.

SEC. 50. When land is sold for assessments correctly imposed, no misnomer or mistake relating to ownership affects sale.

SEC. 51. Collector to settle with secretary and treasurer on first Monday of each month, and within six days deliver to secretary statement under oath as to transactions.

PAYMENT OF BONDS AND INTEREST.

SEC. 52. Interest coupons paid from bond fund and whenever bond fund exceeds ten thousand dollars over amount necessary to pay interest due, district may after advertisement purchase from lowest bidders bonds not yet due to amount of said sum; but no bonds to be redeemed above par. If no bonds offered for sale, excess in bond fund to be invested in government or state bonds.

CONSTRUCTION OF WORKS.

Letting contract; payment of claims and care of funds; progress reports to State Engineer.

SEC. 53. After adoption of plans, and advertisement for twenty days, directors shall let work to lowest responsible bidder or bidders, or may reject any or all bids and readvertise, or may construct work under their own superintendence. Contracts for material to be awarded to lowest responsible bidder. Successful bidder to give bond for twenty-five per cent of contract price.

SEC. 54. Claims to be paid only on warrants. Sums in construction fund in excess of $25,000.00 may be deposited with county treasurer, who shall report receipts and disbursements second Monday in each month. District treasurer to report first Monday in each month.

SEC. 54½. During construction of work paid for from bonds, secretary to forward to State Engineer within one week after each regular meeting of board copies of progress reports made on such work; shall also forward to State Engineer copy of annual financial statement required by section 14, together with general report on condition of works and other relevant matters. State Engineer to make such recommendations and comments as he may deem proper; he may also make further examinations, call for further information, or make further reports.

Payment for property or works or rental; tolls and charges; crossings; rights of way; dedication of waters.

SEC. 55. Costs of property and works to be paid out of construction fund, except that amounts due in yearly installments under lease or contracts shall be paid from annual assessments or from tolls and charges. For defraying expenses of organization, care, operation, management and repair and improvement of works completed and in use, and above mentioned installments, directors may in lieu (in part or in whole) of assessments, fix rates of tolls and charges.

SEC. 56. Directors shall have power to construct works across any stream, street, railway, canal, etc.; and every company whose railroad shall be so crossed shall unite with the district in forming crossings, cost thereof to be determined by agreement, or as in taking of land. Rights of way granted over state lands, and all water rights within district belonging to state, given, dedicated, and set apart for uses of district.

DIRECTORS AND OFFICERS.

Salaries and mileage; interest in contracts and penalties.

SEC. 57. Directors to receive four dollars per day each, and ten cents per mile mileage, and necessary expenses when engaged in official business under order of board; except that in districts of over five hundred thousand acres, directors shall receive one hundred and fifty dollars per month each in lieu of per diem. Directors shall fix compensation of all officers; except that on petition of at least fifty or a majority of freeholders, directors shall submit schedule of salaries and fees at any general election. Above petition to be presented between twenty and forty days prior to election.

SEC. 58. No director or officer shall be interested in any contract, violation constituting misdemeanor and resulting in forfeiture of office and liability to fine or imprisonment, or both.

SPECIAL ASSESSMENTS.

Levy by special election; levy without election; emergency levies; ascertainment of rate.

SEC. 59. Directors may call special election on special assessment to be used for any of the purposes of the act, election to be held in conformity with section 30. Two-thirds vote necessary to carry. If carried shall be added to annual levy. Assessment not exceeding two per cent of value of assessable property may be levied in any one year without vote by four-fifths of directors, total amount not to exceed $75,000.00; *provided*, that if petitioned by voters equaling in number fifteen per cent of votes cast at last general election within thirty days, special election on such levy shall be necessary; *and provided*, that in case flow in canal unexpectedly interrupted, four-fifths of the directors may levy assessments in any one year, at time of annual levy, not exceeding forty thousand dollars for repair of works, without election.

SEC. 60. Rate of assessments levied under act to be ascertained by deducting fifteen per cent for delinquencies and dividing sum voted by remainder of aggregate assessed value. Special assessments shall be collected in same time and manner as other assessments.

INCURRING INDEBTEDNESS.

Limitation: indebtedness before first assessment and payment by warrants; interest on warrants. Special provisions for districts of over 500,000 acres.

SEC. 61. Incurring of debt limited by express provisions of act, except that before collection of first assessment, directors may incur indebtedness up to two thousand dollars, or, if district contains more than four thousand acres, to one-half as many dollars as there are acres in district, and may issue warrants therefor, bearing interest at not more than seven per cent, and in no case exceeding fifty thousand dollars. Warrants to be payable not later than the first day of January after levying of first assessment.

SEC. 61*a*. Any warrant of district payable on demand, and presented for payment when no funds are available therefor, shall draw interest at not to exceed seven per cent, until public notice given that funds are available. After public notice interest on warrants shall cease.

SEC. 61*b*. Directors of districts of over 500,000 acres may acquire system supplying lands thereon, and where part of system lies outside of state, may exchange bonds for all or portion of system, or for interest in or stock of corporation owning all or part of system.

SEC. 61*c*. Where directors have exchanged or agreed to exchange bonds for property rights in system, as in section 61*b*, court shall decree validity of bonds issued or to be issued.

APPORTIONMENT OF WATER.

SEC. 62. General provision regarding water commissioners.

SEC. 63. Directors shall keep water in ditches to full capacity in times of high water.

SEC. 64. Navigation and mining not to be impaired or affected by act, except that rights of way may be acquired over property used in mining.

SEC. 65. General provision disclaiming authorization of any diversion except with previous compensation in accordance with the law.

EXEMPTION FROM TAXATION.

SEC. 66. Rights of way, ditches, reservoirs, etc., and other property of like character belonging to any irrigation district, not to be taxed for state, county, or municipal purposes.

FUNDS.

SEC. 67. Creates bond fund, construction fund, and general fund.

CONFIRMATION PROCEEDINGS.

Proceedings by directors; proceedings by assessment payer; consolidation of actions; disregard of error; contests.

SEC. 68. After issue of any bonds or levy of any assessment directors may bring action in superior court to determine validity. Action shall be in nature of proceeding *in rem* and jurisdiction of parties interested may be had by publication of summons. Validity may be contested by any party interested within ten days, with right of appeal to supreme court within thirty days, which must be determined within three months.

SEC. 69. If no proceedings brought by directors, any assessment payer may bring such action within thirty days after assessment or bond issue, directors being made defendant.

SEC. 70. Similar contests shall be consolidated.

SEC. 71. Court must disregard any error, irregularity, or omission which does not affect substantial rights of parties to action.

SEC. 72. Contests shall only be made within time and in manner specified in act, and in any such action, all findings of fact or conclusions of directors, or of supervisors, shall be conclusive, unless such action was instituted within six months after such finding or conclusion was made.

VIOLATION OF DUTY AND PENALTY.

SEC. 73. Violation of any express duty on part of any officer named in act shall render such officer liable on his official bond, and to removal from office by proceedings in superior court brought by any assessment payer.

EXCLUSION OF LANDS.

Covered by sections 74 to 84, inclusive. Land may be excluded in discretion of directors on petition of owner; *provided*, that upon petition it shall be duty of directors to exclude lands which are not susceptible to irrigation from a common source or by the same system of works with other lands of district, or from source or system chosen or adopted, or which are already irrigated, or entitled to be irrigated, from another source or by other works; except that no land irrigated by means of water pumped from an underground source shall be entitled to exclusion on account of being so irrigated if such land is or will be substantially benefited by subirrigation from works of district or by drainage works provided by district, but no owner of land so irrigated when district was organized and which has been so irrigated continuously each year exclusively by such means, shall be liable to assessment, except for interest and principal on district bonds. Holders of outstanding bonds are protected, by retaining lien against excluded lands for both bonds and interest, except where written assent of such bondholders to exclusion has been filed with district.

INCLUSION OF LANDS.

Covered by sections 85 to 97, inclusive. Owners of one-half or more of any contiguous tract adjacent to a district may petition for inclusion in said district. Directors may deny petition after hearing or may grant petition if no objection is offered by any person interested in district or proposed change, or if objections offered are withdrawn. If objections to inclusion are made and not withdrawn and directors still believe it for best interests of district that lands be included, matter shall be determined by majority vote at special election in district. Directors may require, as condition precedent to inclusion, that petitioners shall pay such sums as they would have been required to pay had such lands been included at the time of organization. Adjacent public lands of United States may be included without petition. If directors find unconditional inclusion would injure land already in district by impairment of water right, or greater expense of water for additional lands, they may prescribe conditions for inclusion, by providing for priority of water right or additional annual payment or other just conditions.

REDUCTION OF BONDED INDEBTEDNESS.

Covered by sections 98 to 99½, inclusive. Where no bonds are outstanding, authorized bonded indebtedness may be reduced if carried by majority vote at special election called by directors. If there be bonds outstanding, bonded indebtedness may be reduced with the assent of outstanding bondholders. Reduction of bonded indebtedness shall in no manner affect any order of the court confirming validity of bonds.

LEASE OF WATER FOR MECHANICAL PURPOSES.

Covered by sections 100 to 105, inclusive. If no increased expenditure is involved, directors may lease water owned by it for mechanical purposes, not inconsistent with the provisions of the act. Notice of intended lease must be published for twenty days, sealed proposals received, and lease let to highest responsible bidder, or bids may be rejected. Rental on such lease shall be payable on thirtieth of December and thirtieth of June of each year. Lease may extend not exceeding twenty-five years. If rental not paid as due, amount may be doubled, and if not paid within ninety days thereafter, lease shall be forfeited to district, together with the works owned or controlled by lessee. Board may require lessee to execute bond or give other evidence of good faith.

DESTRUCTION OF UNSOLD BONDS.

Covered by sections 106 to 108, inclusive. Bonds remaining unsold after completion of system and payment of all demands may be destroyed on approval by two-thirds vote at special or general election called by directors.

SAVING CLAUSES.

Sections 109 and 110. Make districts organized prior to act subject to its provisions, so far as applicable, repeals original district act of 1887, etc.

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STATE OF CALIFORNIA
DEPARTMENT OF ENGINEERING

APPENDIX C

Investigations of the Economical Duty of Water for Alfalfa in Sacramento Valley California

1910-1915

By FRANK ADAMS, RALPH D. ROBERTSON, SAMUEL H. BECKETT, WELLS A. HUTCHINS, and O. W. ISRAELSEN, Cooperative Irrigation Investigations in California.

(Based on data gathered under cooperative agreement between the Office of Public Roads and Rural Engineering of the United States Department of Agriculture, the California State Department of Engineering, and the University of California Agricultural Experiment Station and reprinted from the Fifth Biennial Report of the Department of Engineering.)

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INVESTIGATIONS OF THE ECONOMICAL DUTY OF WATER FOR ALFALFA IN SACRAMENTO VALLEY, CALIFORNIA, 1910-1915.

By Frank Adams, Ralph D. Robertson, Samuel H. Beckett,
Wells A. Hutchins and O. W. Israelsen,

Cooperative Irrigation Investigations in California.

INTRODUCTION.

As a part of the cooperative irrigation investigations in California conducted under agreement between the Office of Public Roads and Rural Engineering,[1] the State Department of Engineering of California, and the California Agricultural Experiment Station, a series of experiments was begun in 1910 at the University Farm, at Davis, California, which sought to determine the most economical duty of water for alfalfa in Sacramento Valley. At the end of the third year of these experiments it was decided to supplement them by investigations on a large number of representative alfalfa farms in Sacramento Valley, in order to test the applicability of the results obtained at Davis to the varying soil and rainfall conditions in other parts of the valley. These latter studies were carried through the seasons of 1913 and 1914 and were in turn supplemented during the season of 1915 by studies on a temporary experimental plat about five miles northeast of Willows. In the meantime the experiments begun at Davis in 1910 were continued through a six-year period, ending with the close of the season of 1915. It is the purpose of this report to present the results of the entire investigation.

Bearing of the Investigation.

It is now well recognized, regardless of the crop irrigated, that a proper knowledge of the duty of water is of importance to both irrigators and the public, and especially is this the case in newly developing irrigated sections such as Sacramento Valley. In this large area where dry grain farming has prevailed so long, and where field crops and live stock admittedly are the basis of the most suitable agriculture for the area as a whole, a proper understanding of the amount of irrigation water that should be applied to alfalfa is of prime necessity. The irrigator must have this information that he may make the necessary arrangement for an adequate water supply, that he may avoid injury of his soil through the application of too much water, and that he may adjust to his land the amount available to him, so as to obtain the largest possible returns per acre-foot of water applied. Further, he must have an understanding of the underground movement of irrigation water after it is applied, that he may be sure, on the one hand, that excessive losses are not occurring through too deep percolation, and, on the other hand, that the irrigation water is penetrating the soil sufficiently deeply to give proper nourishment to the feeding roots of the plants. Especially must the farmer have information as to what becomes of the irrigation water after it leaves the surface where there is such a large percentage of "hard" soil as in Sacramento Valley—soil into which, in its present poor physical condition, it is extremely difficult to make irrigation water reach even 12 to 24 inches below the surface.

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[1] Prior to July 1, 1915, between the Office of Experiment Stations and the California agencies named.

EXPERIMENTS AT THE UNIVERSITY FARM AT DAVIS.

During 1910 and 1911, a tract of 8.19 acres was utilized in the experiments at Davis, the land being in square and contour checks 0.20 to 1 acre in area and averaging 0.28 acre. The soil of these plats is classified by the Bureau of Soils and the University of California as Yolo loam.[1] From 1912 to 1915, inclusive, 3.48 acres were utilized, divided into 15 square checks, averaging 0.23 acre each. The schedule of irrigation followed during the first two years included, in addition to check plats receiving no irrigation, total applications of 12, 24, 36, and 48 inches in depth. This same schedule was continued throughout the series of experiments, except that beginning in 1912 additional checks were provided that received depths of 18 inches and 60 inches, respectively, per year. The checks that received depths of 12, 18, and 24 inches were subjected to single applications at the rate of six acre-inches per acre. With total depths of 30, 36, 48, and 60 inches, individual applications were of 7.5 inches, 9 inches, 12 inches, and 15 inches, respectively. In 1910, 1912, and 1913, following winters of low rainfall, the first irrigations of the season were given immediately after the first cutting, but in 1911, 1914, and 1915, after relatively wet winters, irrigation began after the second cutting. Water was applied to the plats at Davis from a pumping plant on the tract which delivers approximately 0.9 cubic foot per second, and throughout the series of experiments the practice was to irrigate just as soon as possible after removing the crop from the field. In most cases the water was distributed in slip-joint pipe because it was not possible otherwise to obtain even distribution with the small irrigation head available. In every case, yields were weighed at the time of removal from the fields.

In the time of cutting, raking, shocking, and hauling the hay, standard field practices always were observed. That is to say, the alfalfa usually was cut when one-tenth to one-third was in bloom and the hay generally was raked the same day, shocked the following day, and hauled as soon as it was dry enough to be stacked without heating, never being left until the leaves were dry enough to fall off when handled. The curing and removal of the hay from the field required from five to seven days. As soon as possible after the crop had been hauled from the field, irrigation water was applied.

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[1] United States Department of Agriculture, Bureau of Soils, Reconnoissance Soil Survey of the Sacramento Valley, California.

The following table summarizes the results of the duty of water studies over the six-year period:

TABLE No. 1.

Summary of Alfalfa Duty of Water Investigations at Davis, 1910-1915.

Number of irrigations	Unit depth each irrigation, inches	Depth of water applied, inches	Yield, tons per acre							Average value of hay per acre at $7 per ton[1]	Average cost of production per acre[2]	Average profit per acre
			1910	1911	1912	1913	1914	1915	Average			
None	------	------	3.85	5.94	5.52	2.75	2.89	2.35	3.88	$27 16	$8 73	$18 43
Two	6	12	4.78	7.52	6.51	4.31	5.83	4.84	5.63	39 41	15 37	24 04
Three	6	18	------	------	7.02	5.69	8.02	6.46	6.80	47 60	19 35	28 25
Four	6	24	6.00	8.38	8.32	6.89	9.96	7.96	7.92	55 44	23 22	32 22
Four	7½	30	7.53	9.54	9.43	7.97	11.06	8.32	8.98	62 86	26 45	36 41
Four	9	36	7.58	9.33	9.38	8.22	12.48	8.63	9.27	64 89	27 96	36 93
Four	12	48	8.45	9.52	8.63	8.83	10.62	8.05	9.02	63 14	29 10	34 04
Four	15	60	------	------	10.17	7.25	10.70	5.55	8.42	58 94	29 44	29 50

[1] Market value of hay, 1910, 1911 and 1912, $11 per ton; 1913, $9; 1914, $4; 1915, $8.

[2] Labor of production, including cutting, raking, shocking and hauling, figured at $2.25 per ton. Water figured at $1.70 per acre-foot. Labor for irrigation figured at $0.50 per acre per irrigation.

Examination of this summary indicates that while both the average maximum yields and the average maximum profits were greatest in the case of annual applications of 36 acre-inches of irrigation water per acre, it is clear that neither the average increase in yield nor the average increase in profits, with applications at the rate of 36 acre-inches per acre per year over the average yields and profits with applications at the rate of 30 acre-inches per acre per year, was large enough to be material with water costing at the rate figured in the Davis experiments. It is plain, however, that to the extent that water costs less than $1.70 per acre-foot, the increase in net profits with annual depth of 36 inches over the figures for annual depths of 30 inches would be correspondingly greater, and very much greater if water were paid for at the flat annual rate of $1.50 or $2.00 per acre, as was the rule in a number of the Sacramento Valley areas included in the general investigation. The significant fact about the results at Davis is that the increase in yield tends to become negligible above annual depths of 30 to 36 inches, indicating that under conditions at Davis, a maximum allowance of 36 acre-inches per acre per year is ample. This is further brought out graphically in the accompanying chart. (Fig. 1.)

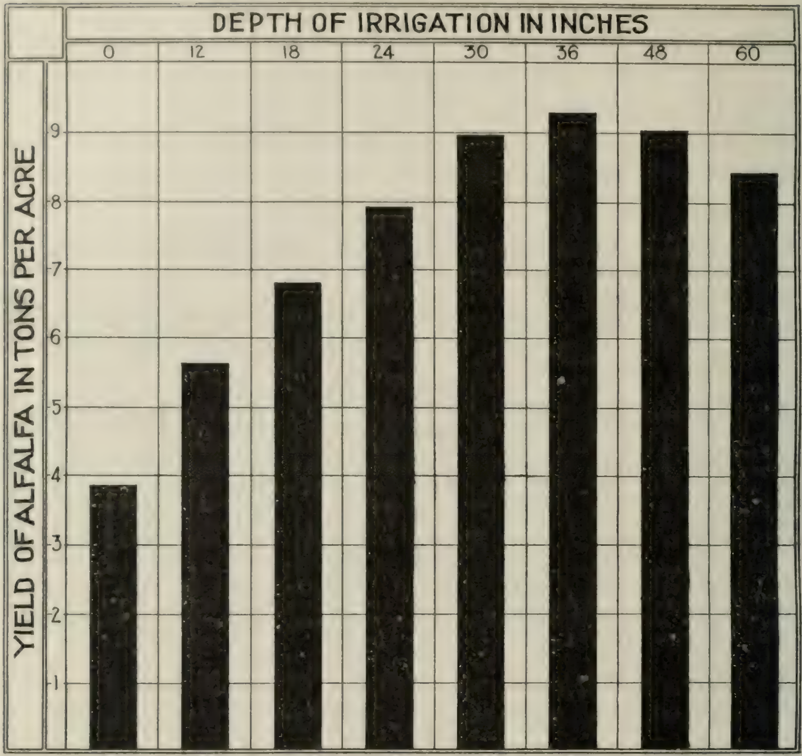

Fig. 1.—Diagram showing results of alfalfa duty of water experiments at University Farm, Davis, 1910 to 1915.

The most marked change from year to year in the relation of the averages to each other took place in the 60-inch applications. The 1912 yield from the most heavily irrigated plat was more than 10 tons per acre, but the average dropped to 8.42 tons per acre by 1915, and had the investigations been conducted longer this average doubtless would have decreased each year. The 1915 yield was only 5.55 tons per acre, owing to the quantity of rank water grass which had supplanted the alfalfa.

A wide variation in the seasonal rainfall and in the length of the growing season was observed at Davis. Both of these factors seemed to have a decided effect on the yields of hay, as shown by the following table:

TABLE No. 2.

Relation of Climate to Yields of Hay at Davis.

Season	Rainfall	Length of growing season[1]		Average temperature, deg. F.	Number of cuttings	Average yield of hay per acre from all checks
		Dates	Number of days			
1909–1910	11.90	Mar. 22–Oct. 10	202	57.7	6	6.36
1910–1911	23.18	Feb. 27–Oct. 7	222	58.3	6	8.37
1911–1912	9.46	Mar. 3–Oct. 10	221	57.9	6	8.12
1912–1913	8.74	Mar. 4–Sept. 17	197	58.0	5	6.49
1913–1914	28.70	Feb. 6–Oct. 26	262	60.0	6	8.94
1914–1915	20.05	Jan. 23–Oct. 13	263	59.5	6	6.52
Average	17.00	Feb. 23–Oct. 9	228	58.6		7.48

[1] Period between date of last killing frost in the spring and the date of cutting last crop the following fall.

Although no conclusions are drawn from these observations the effect of climatological factors on crop growth and yields under irrigation is shown clearly.

Immediately following the harvesting of the last crop at Davis, on October 13, 1915, five areas, each containing 100 square feet, were laid off on each plat included in the experiment and the number of plants in each area counted. The probable number of plants per acre was figured from the average of these counts. By field count a good stand of mature alfalfa was found to contain an average of one and one-half plants per square foot. With this as a basis of comparison, the following table was compiled:

TABLE No. 3.

Estimated Per Cent of Alfalfa Stand Remaining at Davis at End of Six-year Experimental Period.

Number of plats	Depth of water applied, inches	Number of plants per acre	Per cent of good stand remaining
17, 30		8,625	13.2
18, 29	12	22,216	34.0
19, 28	18	30,928	47.3
20, 27	24	33,977	52.0
21, 26	30	41,382	63.3
22, 25	36	39,422	60.3
23, 24	48	38,333	58.7
31	60	17,598	26.9

This shows the effects of the two extremes in the application of water, especially when it is remembered that the observations on the 60-inch application extended over a period of only four years and in this time the stand, as a result of over-irrigation, was reduced to an estimated average of only 27 per cent of the original.

Soil Moisture Determinations at Davis.

Beginning with 1913 and extending through three years, very complete studies were made of the moisture content of the alfalfa plats. In the table below are given averages of the results of the three seasons observations, representing the number of inches applied and percentages retained by the upper six feet and upper twelve feet of soil. The plats which received no irrigation are not included in this table.

TABLE No. 4.

Acre-inches and Per Cent of Applications Retained by Soil, Davis Alfalfa Plats, 1913-1915.

Number of plats	Number of irrigations per season	Depth of water applied at each irrigation, inches	Amount of water retained in upper 6 feet of soil		Amount of water retained in upper 12 feet of soil	
			Inches	Per cent of quantity applied	Inches	Per cent of quantity applied
18. 29	2	6.0	3.81	63.5	----------	----------
19, 28	3	6.0	5.52	92.0	----------	----------
20, 27	4	6.0	4.43	73.8	----------	----------
21, 26	4	7.5	5.10	68.0	8.00	106.6
22, 25	4	9.0	5.49	61.0	9.56	106.1
23, 24	4	12.0	6.68	55.6	10.32	86.0
31	4	15.0	9.24	61.6	13.09	87.2
Average, 6-foot tests[1]	----------	6.0	4.59	76.4	----------	----------
Average, 12-foot tests	----------	9.5	5.76	[2]60.6	9.29	[2]97.7

[1] Plat 31 omitted from average.

[2] Group averages obtained by giving plat percentages weights proportional to quantities of water applied.

With the exception of plats 18 and 29 and 31, the percentage of water accounted for in the upper six feet of soil decreases with the increase in amount of water applied from 92 per cent for the plats that received three six-inch irrigations to 55.6 per cent for those that received four 12-inch irrigations. The total amounts of water retained in the same depth of soil per season increased with the increase of irrigation water. Examination of quantities retained by the upper 12 feet in plats 21 and 26 and 22 and 25 shows that more water was found in these plats than was applied. It is probable that this condition resulted from a lateral movement from plats 23 and 24 at a depth of seven to nine feet, or immediately above the relatively impermeable clay subsoil found at the ninth foot. This view is supported by the fact that plats 23 and 24 retained only 86 per cent of the twelve inches applied, while the average amount held by plats 21 and 26, 22 and 25, and 23 and 24, in the upper twelve feet of soil, was a little less than 100 per cent. Plat 31, having a finer textured soil, retained more than any other plat and a higher percentage than plats 23 and 24, which received less water.

In 1915, observations were made of the rate of growth of the alfalfa on the various plats. Owing to the fact that the varied irrigation treatments during the three preceding years had resulted in thinning out the stand on some of the plats, the actual rates of growth in 1915 resulted, in a measure, from the effect of these previous treatments. In order to eliminate the effect of thinness of stand and to make the 1915 rates of growth comparable from the standpoint of moisture alone, the growth rate on plats 21 and 26 is taken at 100 for each crop grown and the relative rates on the other plats computed on this basis. Plats 21 and 26 are taken at 100 because thirty inches of irrigation water per annum, the amount given to these plats, evidently represents the most economical duty for alfalfa under the conditions of these experiments. The actual growth rate of the six crops of alfalfa on the plats in 1915 was 49, 51, 112, 96, 106, and 45 pounds per acre per day, respectively. The relative rates of growth for all the plats are given in the following table:

TABLE No. 5.

Relative Rate of Growth of Each Crop of Alfalfa at Davis Experimental Plat, 1915.

Number of plats	Depth of water applied, inches	Relative rate of growth of each crop					
		First	Second	Third	Fourth	Fifth	Sixth
17, 30	----------	47	53	22	22	17	9
18, 29	12	71	61	69	78	39	18
19, 28	18	84	88	73	76	89	45
20, 27	24	104	110	88	92	98	76
21, 26	30	100	100	100	100	100	100
22, 25	36	102	112	117	101	94	100
23, 24	48	104	98	96	110	96	93
31	60	94	86	48	66	42	49

That the preceding winter's rains thoroughly wetted the soil of the experimental tract throughout its entire depth is concluded from the soil moisture observations. Hence conditions in plats 17 and 30 and 21 and 26 for the period of growth of the first and second crops, other than variation in alfalfa stand, may be considered the same, for no irrigation water was applied to any of the plats before the second cutting. The relative rate of alfalfa growth for the first two crops on plats 17 and 30 averaged 50. Hence it appears that the last four cuttings produced 44, 44, 34, and 18 per cent, respectively, of what should have been produced had an average moisture percentage about six per cent above the point at which plants wilt, been maintained, as in plats 21 and 26. Instead, however, the moisture content during the growth period of the last three crops was about seven per cent below the wilting point in the surface foot, slightly below in the second foot, and approximately coincident with it in the lower foot sections.

This amount of moisture is insufficient to support a normal rate of growth. In plats 18 and 29, likewise, the moisture content in the surface foot fell below the wilting percentage shortly after the fourth cutting, and the fifth and sixth crops grew at the rates of only 56 and 26 per cent, respectively, of normal. In plats 19 and 28 the moisture content of the upper two feet was below the wilting point during the growth of the sixth crop, which was unirrigated, and resulted in a rate of growth of only 55 per cent of normal. Plats 20 and 27 showed a moisture percentage in the surface foot coincident with the wilting percentage before irrigation, but seldom approaching that point in the lower depths.

In plats 21 and 26, 22 and 25, and 23 and 24, very little change took place in the relative growth rates during the season, or in *average* moisture percentages. In plat 31, however, an increase in moisture percentage took place as the season advanced, and the small relative yields after irrigation began, that is of the last four cuttings, are due to an excess of moisture. Considering the average of the first two cuttings, as normal,

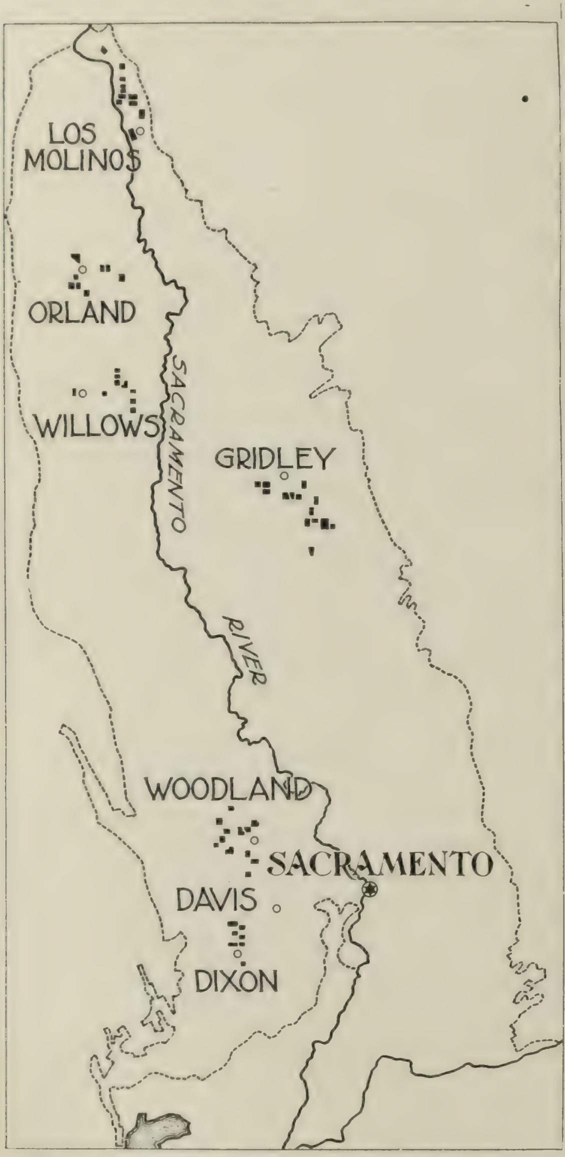

Fig. 2.—Outline map of Sacramento Valley showing location of alfalfa farms on which alfalfa duty of water measurements were made 1913 to 1915.

the third, fourth, fifth and sixth crops were respectively 53, 73, 47, and 54 per cent of normal, or an average of 56 per cent for the period of the irrigation season. On the same basis, plats 21 and 26, 22 and 25, and 23 and 24 produced respectively 100, 97, and 98 per cent of normal yields.

INVESTIGATIONS ON SACRAMENTO VALLEY ALFALFA FARMS.

In selecting the areas away from Davis to be included in the wider investigation (Fig. 2), care was taken to include enough fields so that there would be represented the major soil types of the valley as determined by the soil surveys of the bureau of soils and of the college of agriculture of the University of California, whose soil classifications have been followed in this report; also, to give the investigations as wide a geographical distribution as possible, so that the differences in rainfall could be taken into consideration. Accordingly, during the irrigation seasons of 1913 and 1914, between 40 and 50 representative farms were under observation in the neighborhood of Gridley, Los Molinos, Orland, Willows, Woodland, and Dixon, this work being supplemented in 1915 by detailed studies on a single ten-acre tract five miles northeast of Willows, and by general observations and measurements on four other farms.

While the experiments at Davis were conducted under normal field conditions, without departure from what may be termed merely good field practice, in the investigations on Sacramento Valley alfalfa farms, it was impossible, except in one case, to vary the quantities of irrigation water applied. Nevertheless, it was believed that by taking careful account of the irrigation water in the soil immediately before and shortly after irrigation, and by careful measurement of the amounts of water applied and of the crops taken off, it would be possible to obtain a satisfactory basis for correlation of results. Thus the investigation became not merely a measurement and study of the amounts of water used, but more particularly a study of the underground distribution of the irrigation water applied, and a critical inquiry into the capacity of the various soils of Sacramento Valley to retain irrigation water, the amounts or percentages of moisture necessary to maintain alfalfa growth, and the best means of maintaining these amounts under the conditions met.

Procedure.

Wherever possible, standard weirs were installed for measuring the water applied to the fields. Where sufficient fall was not available for this, and also where registers were not used, those conducting the field investigations made a sufficient number of current meter gagings or gage readings to give satisfactory evidence of the amounts of water being used. In a few instances, chiefly at Orland, automatic water registers were installed for obtaining continuous records. While all the fields under observation were watched carefully for waste at the lower ends of the checks, no measurable waste was found. There was no waste of consequence off the fields where the largest quantities were used, such waste as did occur coming on the fields having heavy soils that failed to absorb the water.

In addition to measuring the quantities of water applied to the surface of the fields, the underground distribution of the water, following its application, was traced in as many cases as possible through soil sampling and moisture determinations. In taking soil samples, extreme care always was exercised to avoid holes previously bored. It was found impossible to trace the underground distribution of the irrigation water in all of the fields, but some work of this nature was done in each section studied. Borings were made to a depth of at least six feet and at least three points in each field one or two days before each irrigation and again at approximately the same points from two to five days after each irrigation. While this method left an interval of several days between soil sampling during which some moisture was used by the crops, and while it also failed to take account of the evaporation losses immediately following irrigations, substantially the correct relation was found by extending the moisture percentage curves, shown in the diagrams accompanying the text, so as to coincide with the moisture percentages immediately before and after increases due to the irrigations. In taking the soil samples for moisture determinations, small tins with an approximate capacity of one-half pound, and with tight-fitting covers, were filled from the center of each foot section; that is, at one-foot intervals beginning one-half foot below the surface and extending to five and one-half feet. During 1913 these samples usually were dried in electric ovens at local field headquarters, but in 1914 all were forwarded to the laboratory at Davis where they could be handled more conveniently. The tins were shipped in tight-fitting compartments in specially made boxes holding 18, a sufficient number of check determinations having been made in the field and in the laboratory to insure that moisture loss in transit would be negligible.[1]

In measuring the areas of the alfalfa fields under investigation, all principal supply ditches were eliminated, but the areas reported include borders and levees and small field distributing laterals which carried the water from the main supply ditches to the checks.

A number of considerations were held in view in making the soil moisture determinations connected with these investigations. In the first place it was desired to ascertain the depth of percolation of the irrigation water in order to know in a general way whether it was getting into the soil sufficiently to meet the needs of the crop, and also whether any appreciable amount was passing below the zone of greatest root growth, generally taken to lie within the upper six feet of soil. In order to express this underground distribution of the irrigation water in a way that would be generally intelligible, the moisture content of each of the upper six feet of soil was first determined in inches per foot of depth of soil and the amounts of water added by irrigation then were determined; also, in inches per foot in depth of soil, on the basis of the borings before and after irrigations. Thus, with the water content of the upper six feet of soil before irrigation known (in some cases the upper 9 or 12 feet), and with an accurate measurement of the amount of water applied to the fields, it was possible to estimate quite closely the proportion of the water that remained or was utilized immediately and the proportion that passed below the depths studied.

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[1] Weighing of about 700 samples both in the field and in the Davis laboratory showed an average loss slightly less than 0.1 per cent during an average time of 36 hours.

Another consideration in view in these determinations was to ascertain the relative amounts of irrigation water contained in the upper six feet of soil as compared with the quantities necessary to prevent wilting of the plants.[1] It was reasoned that this information would indicate, with considerable accuracy, the quantities of water necessary to apply to the several types of soil to meet adequately the needs of the crop.

A final consideration, in view in these studies of the underground distribution of the irrigation water, was the frequency with which irrigation water should be applied in order to meet fully the needs of the plants. In other words, it was desired to learn to the extent possible in the investigation the relative advantages of single irrigations between cuttings and of the more frequent irrigations given to alfalfa in some sections and on some soils. It is plain, for instance, that the less retentive a soil, the greater the frequency of applying irrigation water; also, that the "tighter" the soil, the greater the difficulty of getting into it at one time the amounts of water needed to mature a cutting. This last consideration was especially prominent in connection with the gravelly soils near Orland and the very heavy soils found in some of the sections about Willows. In fact, it was the difficulty of getting irrigation water into heavy soils that led to the continuation of the investigations during 1915 on a single typical field northeast of Willows.[1]

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[1] Expressed technically, the quantities of irrigation water in the soil over and above the "wilting coefficient." For a discussion of this term and its application see United States Department of Agriculture, Bureau of Plant Industry Bulletin 230. In this report the simpler terms, "wilting point" or "wilting percentage" are used.

In the course of the three years of investigation approximately 11,000 moisture determinations have been made, not including those made for the plats at Davis. Of these, 8,000 determinations were for moisture-holding capacity. The soil samples used in these determinations were taken with two-inch soil augers of the posthole type. The field and laboratory records were made on special forms devised for the investigation, and in the soil moisture determinations at Davis a special electric oven was used, the soil being heated to a temperature of 105° to 115° centigrade.

In every case where the amount of water used was measured, the crop yields were ascertained by the most satisfactory means available. In some cases crops either were sold in bulk according to scale weights, or baled, making exact weights available. In a few cases stacks were measured or a sufficient number of shocks to be representative of the whole were hauled to nearby scales and the average weight per shock obtained. In a large number of cases the average weight of shocks was ascertained by weighing on the ground by means of special apparatus devised for the purpose. (Plate I, Fig. 1.)

Gridley Area.

Investigations were conducted here in 1913, only, the work being discontinued after that year because of the high water-table and the consequent impracticability of tracing the underground distribution of the irrigation water applied. Work was done on 14 tracts varying from three acres to 67 acres in size. (Fig. 3.) All of the fields studied received water from the Sutter-Butte canal, which takes its supply from Feather River. The charge for water for alfalfa is $2 per acre per year except to some early settlers who pay $1.

The building of the Sutter-Butte canal system and the introduction of irrigation into this area in 1905 was not accomplished without difficulty. Like other sections of Sacramento Valley, the area was devoted to dry grain farming, although fruit was grown in some sections, also without irrigation. In less than ten years the most skeptical of the old-time grain farmers have become convinced that irrigation is profitable and essential in the up-building of the section. But irrigation has

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[1] In ascertaining the capacities of the various soils under observation in the investigation to retain irrigation water and the rates of percolation of the irrigation water applied, it was necessary to make numerous technical studies which it is not desirable to report in this bulletin. The ascertainment of the water-holding capacities of the various soils and of the amounts of moisture necessary to be present to prevent wilting have, for instance, involved the making of apparent and real specific gravity determinations, physical analyses of the soil in the various fields, and the development and checking of special methods of volume-weight determinations of soils "in place." In some of these studies the cooperation was received of Professor Charles F. Shaw, and assistants, of the Division of Soil Technology of the Department of Agriculture of the University of California.

PLATE I.

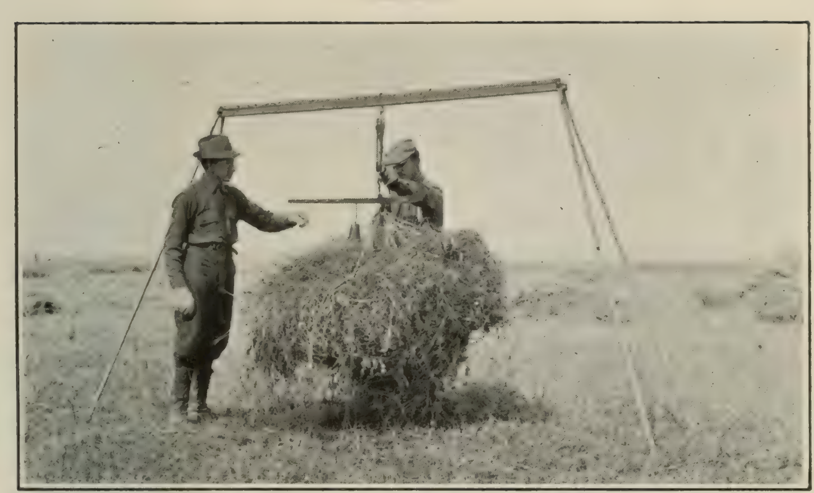

Fig. 1.—Weighing alfalfa hay in the field.

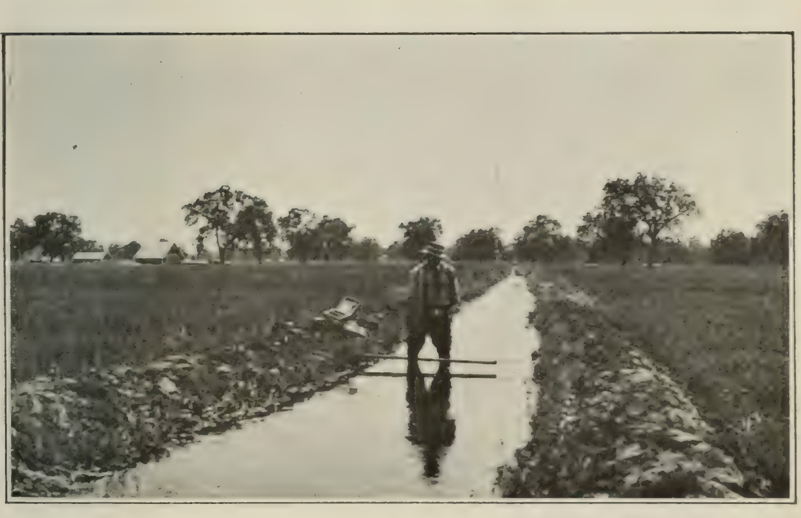

Fig. 2.—Measuring the irrigation "head" with a current meter on Hofhenke alfalfa farm, Los Molinos.

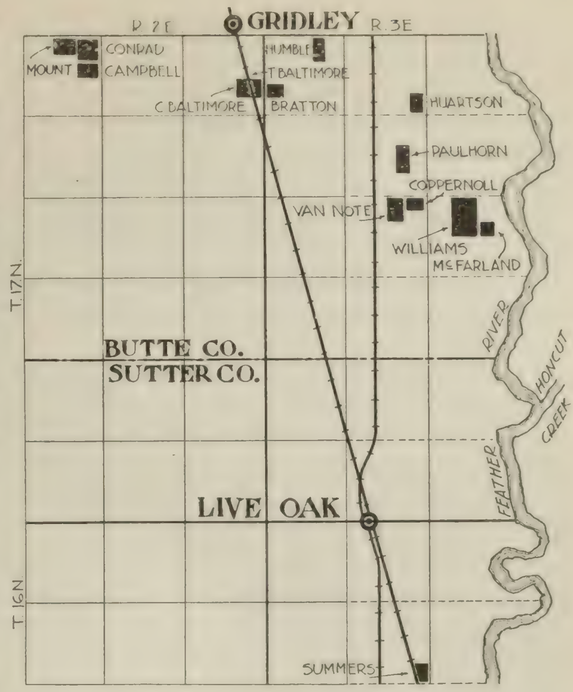

Fig. 3. Map of Gridley area showing location of alfalfa farms under investigation, 1913.

brought problems relating to drainage and the conservative use of water, which are yet to be solved. The average annual rainfall at Biggs, four miles north of Gridley, is 22.24[1] inches.

The soils of the Gridley area have been classified by the bureau of soils and the University of California as Madera and Gridley loams, undifferentiated. Naturally, in a broad classification many departures are to be found. Southeast of Gridley there occurs a body of silt loam within which were located a number of the tracts included in the investigations in 1913. Under most of the soils a noncontinuous hardpan is found within six feet of the surface and occurs frequently within 18 inches, or again may be absent entirely. To quote from the report of the reconnoissance soil survey by the bureau of soils and the University of California.[2]

It will be noted in the description of the individual tracts mentioned later that ground water was found in many fields within three feet to five feet of the surface. As far back as 1907 it stood within six feet of the surface under large areas and after a few days of irrigation rose, in many cases, to within three feet of the surface. In general, the water-table seems to fluctuate over wide ranges and to vary considerably within each season. The need for drainage is well recognized and in some sections it has been or is being provided.

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[1] Weather Bureau, Annual Summary for 1915.

[2] U. S. Dept. Agr., Bureau of Soils, Reconnoissance Soil Survey of the Sacramento Valley, California, p. 87. The hardpan layer in these soils is variable, being in places a thin stratum of easily fractured gray material, usually high in calcium carbonate. In other places it is a very thick, cemented mass lying near the surface. In still other places it is a semicemented mass of mottled grayish and reddish-brown color. The hardpan has a direct and important influence upon the crop value of the soils of this group. As a whole they are friable, easily tilled and retentive of moisture.

Most of the land planted to alfalfa in the Gridley section is prepared in border checks 30 feet to 60 feet wide and 300 feet to 1,000 feet long. Many of the early settlers used rectangular checks with from five to seven to the acre. In applying water to the border checks, which now predominate, an irrigating head of 10 to 15 cubic feet per second is commonly used, most generally divided between two or three checks. The cost of preparing land for irrigation of alfalfa has averaged from about $15 to $20 per acre. The first irrigation of alfalfa generally is given after the first crop of hay is removed, usually in May or early June. Subsequent waterings follow each cutting with the exception of the fifth or last.

As indicated in Table No. 6, the average use of water on the 14 farms under observation in 1913 was 3.31 acre-feet per acre for the season, and the average total yield from five cuttings of alfalfa was 6.19 tons per acre, this yield having been reduced as a result of an invasion of grasshoppers. The greatest quantity used was 4.98 acre-feet per acre applied in five irrigations, and the least was 2.04 acre-feet per acre applied in four irrigations. In several cases the extravagant use noted was due to the inexperience of the irrigator or to a lack of attention when water was being applied. The fact that water usually was sold to irrigators at a flat rate of $2 per acre and with little restraint exercised by the canal company, had a tendency to promote extravagant use. A change in the method of selling water from a flat rate per acre to the quantity basis is desirable, and would to some extent obviate the dangers of overirrigation.

The underground distribution of the irrigation water applied was traced on the Huartson and Williams fields in the Gridley area in 1913.

Huartson Field. The soil is a loam of the Madera and Gridley series, generally uniform to a depth of six feet, and highly permeable. A noncontinuous hardpan about six inches thick is encountered from four to six feet below the surface. Below this is a rather porous, coarse, sandy loam to a depth of about ten feet, with a very impervious, compact, blue clay underlying to a depth of 20 to 50 feet. This field was irrigated four times, moisture determinations being made before and after each of the last three irrigations. At the second irrigation a depth of 7.44 inches was applied, of which 1.68 acre-inches per acre, or 23 per cent, was retained in the upper six feet. A depth of 7.32 inches was given at the third irrigation, of which 5.97 acre-inches per acre, or 82 per cent, was retained in the upper six feet. A depth of 6.84 inches was given at the fourth irrigation, of which 4.88 acre-inches per acre, or 71 per cent, was retained in the upper six feet. In each case four borings were made before and after irrigations, and ground water generally was found at a depth of approximately six feet, the latter obviously affecting the moisture content of the soil almost to the surface. Borings to a depth of six feet after the fourth irrigation indicated that almost all of the pore space in the sixth foot of soil was filled with water. Considering the last three irrigations together, it was found that 58.1 per cent of the quantity of water applied was retained in the upper six feet, this being increased to 73 per cent by adding an estimated quantity for loss between irrigations and soil borings. Throughout the period of the last three irrigations, the moisture content below the second foot in depth was far above the wilting point. Considering the high ground water level under this field it is obvious that even the 6.84 to 7.44 acre-inches per acre applied at single irrigations to this field were slightly excessive.

Williams Field. The soil is a little more compact and less permeable than that in the Huartson field. Five irrigations were given in 1913 and moisture determinations were made from four borings before and after the second, third, and fourth, the depths of water applied in these three irrigations being 6, 4.44, and 7.20 inches, respectively. In boring for soil samples it was attempted to go to a depth of six feet, but the high water-table prevented satisfactory results below a depth of three feet. The average quantity of water applied at the second, third and fourth irrigations was 5.88 acre-inches per acre, of which an average of 47 per cent was retained in the upper three feet of soil.

Results of these investigations are summarized in Table No. 6.

TABLE No. 6.

Summary of Results of Alfalfa Duty of Water Investigations, Gridley Area, 1913.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
J. W. Humble	Silt loam	18.43	4	2.55	5	5.84
T. Baltimore	Silt loam	14.93	4	3.42	5	7.20
F. L. Bratton	Silt loam	3.29	4	3.82	5	6.83
Chas. Baltimore	Silt loam	26.40	5	4.98	5	6.95
W. R. Huartson	Silt loam	7.42	4	2.64	5	9.38
C. W. Van Note	Clay loam	27.20	5	2.37	5	5.97
W. G. Coppernoll	Silt loam	13.96	5	2.83	5	7.28
M. B. Williams	Silt loam, clay loam	67.29	4	2.04	5	5.80
A. J. McFarland	Silt loam	9.44	5	4.16	5	4.19
John Paulhorn	Silt loam	17.10	4	3.93	5	5.88
C. W. Summers	Sandy loam	7.00	4	2.23	5	5.92
G. W. Conrad	Silt loam, sandy loam	37.59	6	3.81	5	4.84
G. L. Campbell	Silt loam, sandy loam	16.76	5	3.89	5	6.13
C. W. Mount	Clay loam	17.41	6	3.70	5	4.54
Averages				3.31		6.19

NOTE.—Rainfall November 1, 1912, to October 31, 1913, 1.16 feet.

DESCRIPTION OF FIELDS IN THE GRIDLEY AREA AND COMMENTS ON IRRIGATION CONDITIONS AND PRACTICES.

J. W. Humble Field. Seeded in 1909. Stand of alfalfa uniform. Water table at 3.5 feet below surface during irrigation season. Field in border checks about 60 feet by 260 to 440 feet, with average grade of four inches in 100 feet. Levees four feet wide on top, 8 feet wide on bottom, and six inches high. Water applied once after each cutting, with the exception of the last. An irrigation head of 4.5 to 6.5 cubic feet per second, divided between two checks, irrigation progressing at rate of .8 to 1 acre per hour.

Thurston Baltimore Field. Seeded in 1911. Field prepared in border checks 35 feet wide and 870 feet long with average grade of eight inches per 100 feet in the upper one-half of the field and four inches per 100 feet from center to lower end. Water applied once after each cutting, with exception of last. Head of eight to ten cubic feet per second being divided between two or more checks, no water being wasted at lower end of checks. Borings were made in 1913 to depth of six feet before and after each irrigation. In the higher part of field water table stood five to six feet below surface, while in lower end it was two feet below, these depths being about constant throughout irrigation season.

F. L. Bratton Field. Seeded in 1908. Stand of alfalfa good. Land in rectangular checks averaging 45 feet by 72 feet. Average irrigation head varied from four to eight cubic feet per second, being divided into four or more checks. Four irrigations given. Use could have been greatly reduced by better location of field ditches and arrangement of checks. The fact that several different men were hired to irrigate also accounts for excessive use of water.

Chas. Baltimore Field. Seeded in 1907. Lies west of Thurston Baltimore tract and has good stand. Water table stood at about 3.5 feet below surface during irrigation season. One-half of field prepared in border checks 30 feet by 400 feet with average grade of five inches in 100 feet, remainder being in rectangular checks 70 by 80 feet. Average irrigation head 4.5 to 6 cubic feet per second, generally turned into two or more checks. Water applied after first and second and before third, fourth, and fifth cuttings. Better results might have been secured in part of field by increasing size of head used on individual checks.

W. R. Huartson Field. Seeded in 1909, has excellent stand. Field in border checks 65 feet by 600 feet with average grade of 2.5 inches in 100 feet. Head of 1.7 to 3.5 cubic feet per second applied once after each cutting except the fifth. Water table five to six feet below surface during irrigation season. Water carefully used and excellent returns secured.

C. W. Van Note Field. Seeded in 1909. Stand good and land well prepared for irrigation. Water table four to six feet below surface during irrigation season. Field in border checks, most of which are 50 feet by 620 feet with average grade of two to three inches in 100 feet. Irrigation head of 8 to 13 cubic feet per second divided among two or three checks, irrigation with latter head progressing at rate of about two acres per hour. Water applied once after each cutting and use conservative.

W. G. Coppernoll Field. Seeded in 1910. Stand good and land well prepared in border checks 50 to 55 feet by 460 to 560 feet, with average grade of five to six inches in 100 feet. Average head of 13 to 16 cubic feet per second divided among three or four checks, the land being irrigated at rate of about three acres per hour.

Milo B. Williams Field. Seeded in 1908. Stand good and preparation of land fair. Water table 3 to 3.5 feet below surface during irrigation season. Field in rectangular and border checks of various sizes, some 80 feet by 200 feet and others 60 feet by 450 feet. Average irrigation head varied from 10 to 16 cubic feet per second, divided into two or three streams. Two men usually irrigated at rate of two or three acres per hour and use was conservative.

A. J. McFarland Field. Seeded in 1909. Stand and preparation of land fair. Field divided into border checks 60 feet by 623 feet with average grade of eight inches in 100 feet. Average heads of eight to ten cubic feet per second divided between two checks. Inexperience of irrigator and lack of attention during times of watering accounts largely for the extravagant use of water.

John Paulhorn Field. Seeded in 1908. Water table 3.5 feet below surface during irrigation season. Field irrigated by flooding from field ditches, 13 to 15 cubic feet per second being divided into two or three ditches. A more economical use of water could have been attained with better preparation of the land.

C. W. Summers Field. Seeded in 1907. Water table three to five feet below the surface during irrigation season. Field in border checks 55 feet by 465 feet, with average grade of four inches in 100 feet. Average irrigation head of four to six cubic feet per second applied once after each cutting of alfalfa, with exception of fifth, irrigation progressing at rate of one acre per hour.

G. W. Conrad Field. Seeded in 1909. Land well prepared and stand fair. Water table about 3.5 feet below surface during irrigation season. Field in border checks 40 feet by 600 feet, with average grade of 0.6 inch in 100 feet. Levees have bottom width of four to six feet and are six inches high. This tract received six irrigations with average of five to seven cubic feet per second.

G. L. Campbell Field. Seeded in 1911. This tract adjoins Conrad tract and has good stand. Water table 3.5 feet below surface during irrigation season. Field in border checks, some 35 feet by 280 feet, with average grade of four to six inches per 100 feet. Average of five to seven cubic feet per second turned into three or four checks. Sometimes irrigation practised at night and water allowed to waste.

C. W. Mount Field. Seeded in 1910. Land fairly well prepared for irrigation but stand has been damaged by excess of water. Water table about 3.5 feet below surface during irrigation season. Field in border checks 60 feet wide and varying in length from 420 to 1,160 feet, with average grade of two inches per 100 feet. Average of four to six cubic feet per second used and considerable water wasted through carelessness of hired irrigators.

Los Molinos Area.

Investigations were conducted on nine fields near Los Molinos in 1913 and on ten fields in 1914, all lying within the 12,000-acre Los Molinos irrigation project, in Tehama County. (Fig. 4.) The first development under the Los Molinos project was in 1908, and by 1914 about 8,500 acres were under irrigation and about 350 families were living on the project.

The average annual rainfall at Red Bluff, about 15 miles north of Los Molinos, is 26.11 inches.[1] Water for irrigation is obtained from Mill and Antelope creeks and is sold by the water company at the flat rate of $2 per acre with a contract allowance of one-fifth ''miner's inch'' per acre, a miner's inch being defined as 14,000 gallons in 24 hours.

The irrigation season for the project is fixed at April 1 to October 1, but due to an abundance of water and to the fact that the project is not yet completely under irrigation, the established rules governing the distribution of water have not been enforced. Water is delivered in rotation in heads of two to five cubic feet per second and the usual practice is to irrigate alfalfa once after each cutting with the exception of the fifth or last crop. The most common method of preparing land is in border checks 40 feet to 60 feet wide and 300 feet to 600 feet long, with a usual grade of three inches to six inches in 100 feet. A number of fields, however, have not been prepared for irrigation other than by some "floating" of the surface.

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[1] Weather Bureau, Annual Summary for 1915.

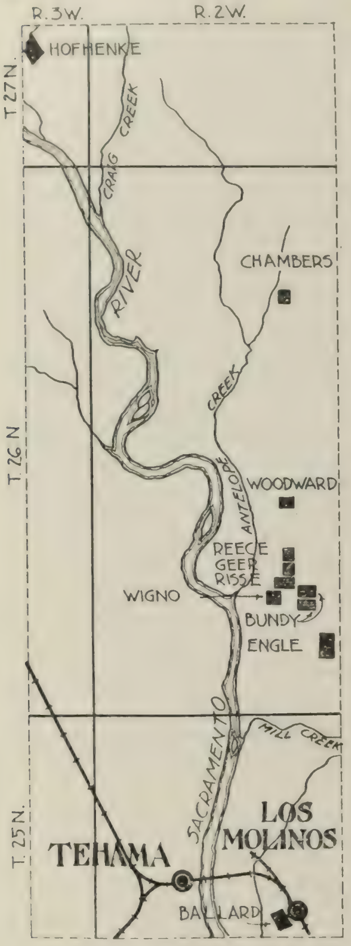

Fig. 4.—Map of Los Molinos area showing location of alfalfa farms under investigation, 1913 and 1914.

During the season of 1913 duty of water measurements under the Los Molinos project were made mostly with a current meter (Plate I, Fig. 2), but in 1914 most of the fields were equipped with rectangular or Cipolletti weirs installed at the entrance of the laterals to the farms. Soil moisture determinations in 1913 were confined to miscellaneous borings and determinations through a part of the season, but in 1914 these determinations were made with fair completeness on five fields. The soils in the Los Molinos area are designated by the bureau of soils[1] as belonging to the Vina series and include mostly clay loams and silt loams.

It is to be noted from the summaries in Tables Nos. 7 and 8 that the actual applications of water varied from 1.42 to 8.46 acre-feet per acre per year, averaging 5.57 acre-feet per acre in 1913 and 4.74 acre-feet per acre in 1914; also that a smaller average use in 1914 gave a larger average yield of alfalfa than was obtained in 1913, undoubtedly due largely to the fact that the rainfall in 1914 was over twice that of 1913. But even when rainfall is added to the irrigation water applied each year there are many instances shown in the summaries where larger quantities of water, both irrigation and rainfall, fail to give proportionate increases of yield. For instance, a total of 6.07 acre-feet of water per acre on the Bundy No. 1 farm gave a yield of 3.02 tons per acre in 1913, whereas a total of 5.08 acre-feet of water per acre on the same farm in 1914 gave a yield more than 90 per cent greater. Again, a total of 4.94 acre-feet of water per acre on the Hofhenke farm in 1913 produced a yield of 8.10 tons of alfalfa, whereas a total of 9.74 acre-feet of water per acre, including rainfall, in 1914 gave a yield of only 5.75 tons, or 28 per cent less.

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[1] U. S. Dept. Agr., Bureau of Soils, Reconnoissance Soil Survey of Sacramento Valley, California.

Soil moisture determinations were made on the Wigno, Bundy, Hofhenke, Geer, and Woodward fields in this area in 1914. The soils of all of these fields were highly permeable. Large quantities of water were applied in each case and the moisture determinations showed beyond a doubt that much water passed below a depth of six feet. In the fine sandy loam soils studied on the Wigno tract the increase in moisture content was as great in the sixth foot as in the surface foot. In the case of the other four fields the increase in the lower depths also was sufficient to indicate that much of the irrigation water passed below the depths reached by the soil augers. Speaking generally of the four fields, the moisture work indicated that as much water would have been held by the soils if less had been applied; also that sufficient moisture was in the soils of all four fields almost throughout the season to keep the percentage above the wilting point. A more complete statement of moisture work on these five fields follows.

Wigno Field. Figure 5 shows diagrammatically the changes of moisture content in this field throughout the irrigation season of 1914 for each foot in depth in the upper six feet of soil.[1] The soil of this field is fine sandy loam of the Vina series, and is very uniform to a depth of 12 feet. The field was irrigated four times in 1914. The first moisture samples were taken May 8th, eleven days before the first irrigation, the average moisture content shown by three borings to a depth of six feet having been 15.65 per cent. An irrigation on May 19 of 5.95 acre-inches per acre raised the moisture content in the upper six feet of soil to 25.71 per cent of the water applied; 90 per cent was retained in the upper six feet, the quantities retained in each foot increasing with the depth. The second irrigation, amounting to a depth of 23.18 inches, was given June 20th, eight borings for moisture samples being made June 18th and June 24th. Only 5.67 of the 23.18 acre-inches applied per acre, or a little less than 25 per cent of the total, was retained in the upper six feet of soil. The third irrigation, amounting to a depth of 15.78 inches, was given July 28, moisture samples being taken from eight holes July 22d and July 30th. A total of 4.90 acre-inches per acre, or approximately 31 per cent of the amount applied, was retained in the upper six feet of soil. The last irrigation, amounting to a depth of 28.04 inches, was given on September 10th, eight borings for moisture samples nine feet deep being made September 7th and again September 14th. A total of 4.83 acre-inches per acre, or 17 per cent of the amount applied, was retained in the upper nine feet, 12 per cent, or 3.48 acre-inches per acre, being retained in the upper six feet. On November 5th, after the last crop of alfalfa had been removed, eight borings to a depth of six feet showed an average moisture content of 16.53 per cent. Considering the four irrigations together, they are found to average a depth of 18.25 inches each, of which 4.89 acre-inches per acre, or an average of 26.8 per cent of the total was retained in the upper six feet. The diagram shows that the moisture percentage reached or closely approached the wilting point in the upper three feet of soil before each irrigation, but that it was well above the wilting point throughout the season in the third, fourth, and fifth feet below the surface.

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[1] More correctly speaking, this and subsequent similar charts show the range of moisture change between irrigations and at each irrigation.

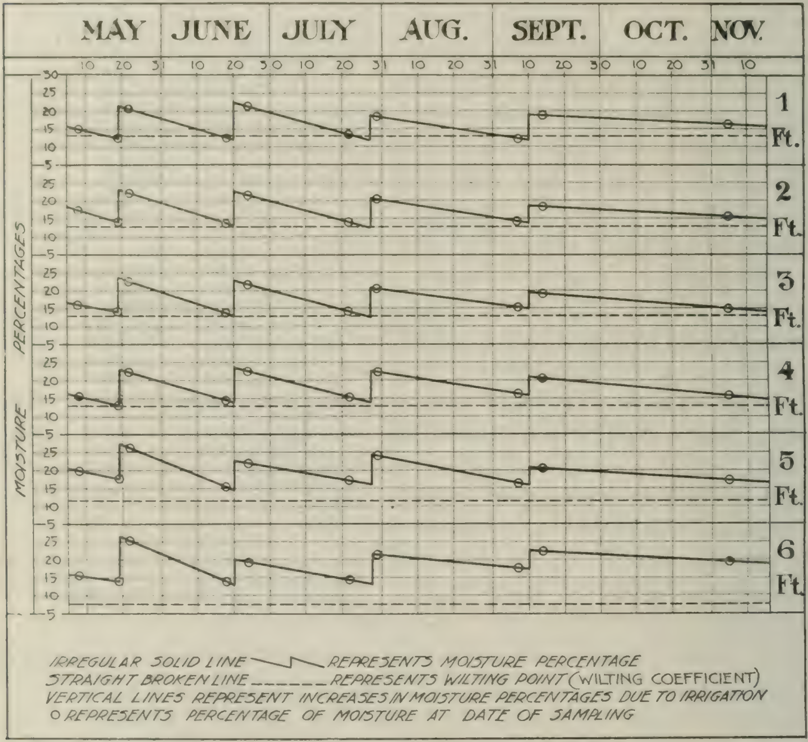

Fig. 5.—Diagram showing seasonal variation in soil moisture percentage, Wigno alfalfa field, Los Molinos, 1914.

Bundy Field. Variations in moisture percentages in this field are shown in figure 6. The soil of this field is a loam of the Vina series, uniform to a depth of at least 12 feet. Four irrigations were given in 1914, 17.72, 12.20, 11.55, and 7.77 acre-inches per acre, respectively, being applied. Six borings were made to a depth of six feet before and after each of the first three irrigations and to a depth of nine feet before and after the fourth irrigation, the moisture determinations indicating that 4.01 acre-inches per acre, or 23 per cent, was retained in the upper six feet at the first irrigation, 3.27 acre-inches per acre, or 27 per cent, at the second irrigation, 4.03 acre-inches per acre, or 35 per cent, at the third irrigation, and 4.73 acre-inches per acre, or 61 per cent, at the fourth irrigation. The average quantity of water applied in the four irrigations was 12.30 acre-inches per acre, of which an average of 4.03 acre-inches per acre, or 32.5 per cent of the amount applied, was retained in the upper six feet of soil. In this field, as shown by the diagram, the moisture percentage reached the wilting point only in the first foot.

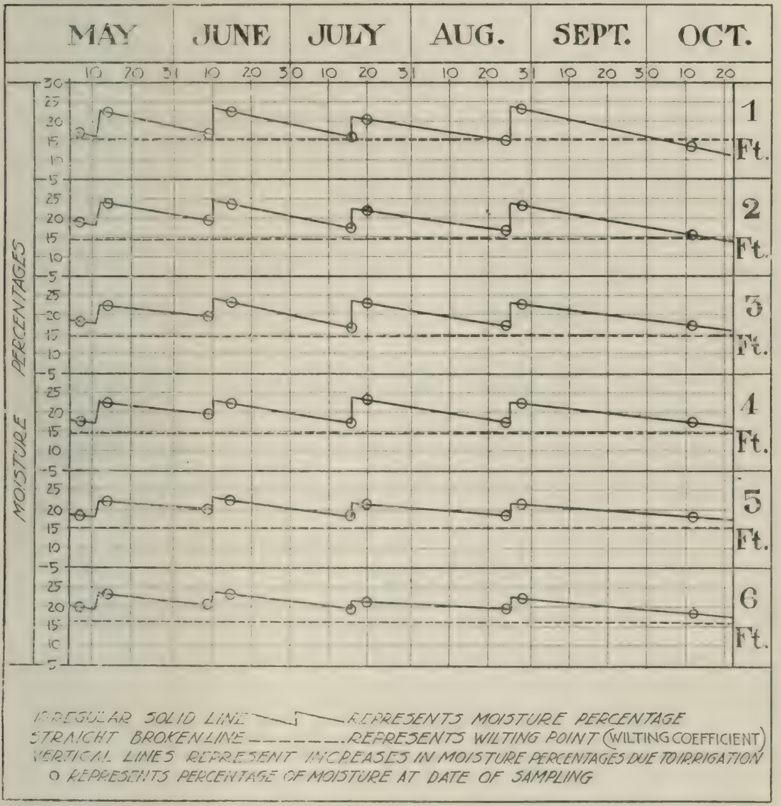

Fig. 6.—Diagram showing seasonal variation in soil moisture percentage, Bundy alfalfa field, Los Molinos, 1914.

Hofhenke Field. Variations in soil moisture percentages in this field are shown in figure 7. Only in August and in the surface foot of soil did the moisture percentage drop to the wilting point. The soil of this field is loam of the Vina series. Irrigations were given in 1914 on June 1st, July 11th, August 16th, and September 21st, the depths of water applied being, respectively, 18.76, 15.74, 18.86, and 13.22 inches. Moisture determinations were made to a depth of six feet before and after the first three irrigations and to a depth of nine feet before and after the fourth, nine borings being made before and after the first irrigation, and 12 before and after each of the others. The quantities of water retained in the upper six feet of soil in the four irrigations were 5.42 acre-inches per acre, or 29 per cent, at the first irrigation, 3.78 acre-inches per acre, or 24 per cent, at the second irrigation, 5.36 acre-inches per acre, or 28 per cent, at the third irrigation, and 3.50 acre-inches per acre, or 26 per cent, at the fourth irrigation. At the latter irrigation 4.65 acre-inches per acre, or 35 per cent, was retained in the upper nine feet of soil. The average depth at each of the four irrigations was 16.62 inches and the average quantity retained in the upper six feet of soil was 4.51 acre-inches per acre, or 27.1 per cent of the total. Adding the estimated loss between irrigations and soil sampling, the average quantity retained in the upper six feet of soil for each of the four irrigations was 5.59 acre-inches per acre, or 34 per cent of the amount applied.

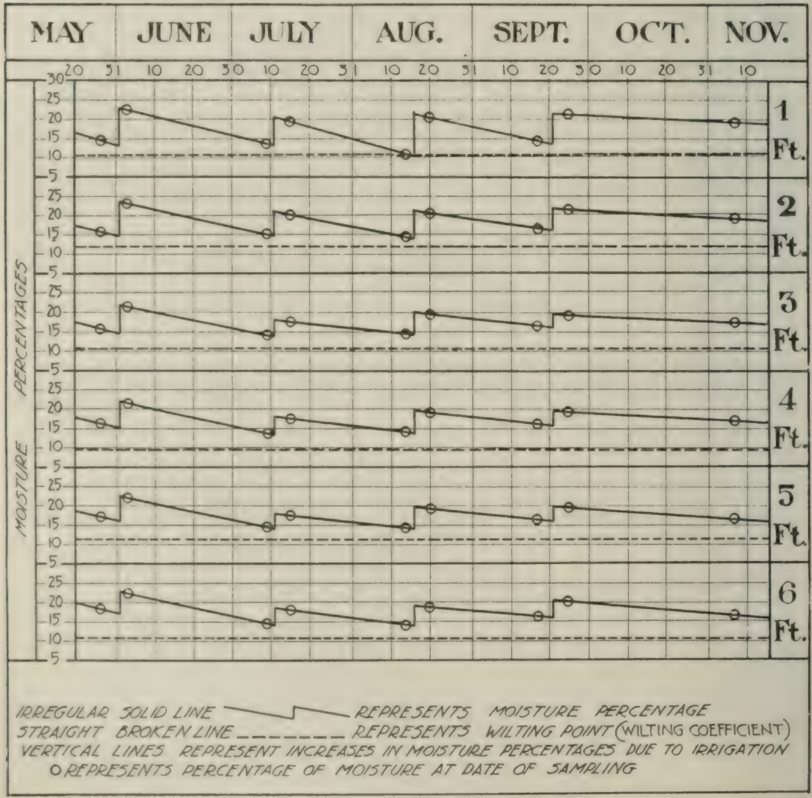

Fig. 7.—Diagram showing seasonal variation in soil moisture percentage, Hofhenke alfalfa field, Los Molinos, 1914.

Geer Field. Variations in soil moisture percentages in this field are shown in figure 8. The soil of this field is classed as a clay loam of the Vina series, the upper two feet being distinctly heavier than the underlying soil, which approaches a silt loam very closely. The diagram shows the wilting point was reached or closely approached in the latter part of July nearly to the full depth of the six feet sampled. Four irrigations were given in 1914, the respective depths applied being 24.00, 18.19, 12.15, and 24.34 inches. Twelve borings for moisture determinations were made to a depth of six feet before and after the first three irrigations and to a depth of nine feet before and after the fourth. These show that the upper six feet of soil retained 5.59 acre-inches per acre, or 23 per cent, at the first irrigation, 3.28 acre-inches per acre, or 18 per cent, at the second irrigation, 5.37 acre-inches per acre, or 44 per cent, at the third irrigation, and 3.76 acre-inches per acre, or 15 per cent, at the fourth irrigation. At the latter irrigation the upper nine feet of soil retained a total of 4.78 acre-inches per acre, or 20 per cent of the whole. The average depth applied at each of

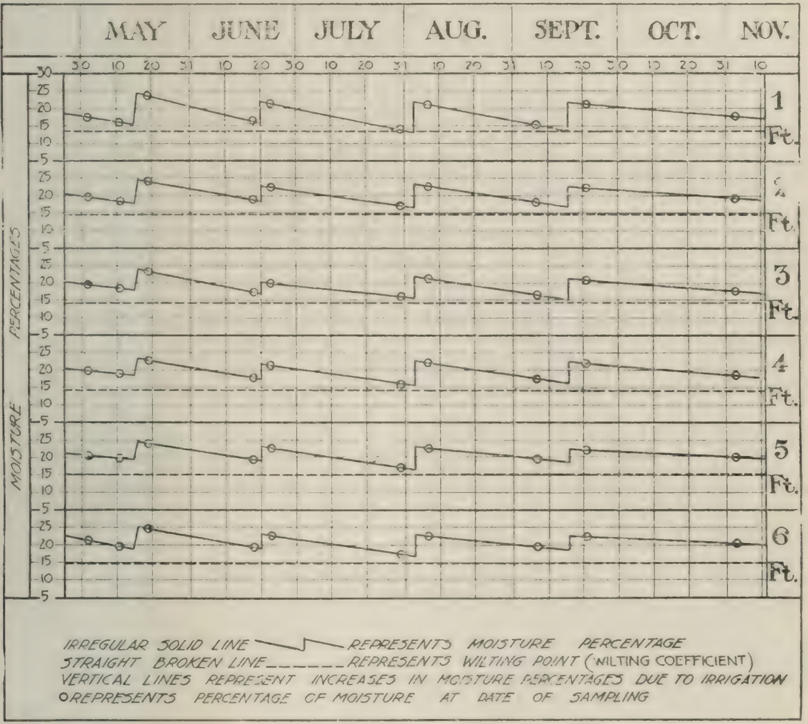

Fig. 8.—Diagram showing seasonal variation in soil moisture percentage, Geer alfalfa field, Los Molinos, 1914.

the four irrigations was 19.67 inches, of which 4.50 acre-inches per acre, or 22.9 per cent, was retained in the upper six feet. With correction for the amounts lost between irrigations and the soil sampling, based on the Davis experiments, an average of 5.58 acre-inches per acre, or 28.4 per cent of the total, was retained in the upper six feet of soil.

TABLE No. 7.

Summary of Results of Alfalfa Duty of Water Investigations, Los Molinos Area, 1913.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
E. A. Bundy, No. 1	Silt, clay loam	8.97	4	4.91	5	3.02
E. A. Bundy, No. 2	Silt loam	4.31	4	6.06	5	7.86
R. W. Ballard	Silt loam	10.18	4	6.01	5	5.38
G. B. Engle	Light gravelly clay loam	17.15	5	4.46	5	3.78
G. H. Geer	Clay loam	9.21	4	7.41	5	7.84
J. F. Hofhenke	Silt loam	24.59	4	3.78	5	8.10
S. B. Reece	Clay loam	13.50	4	6.09	5	4.46
John Risse	Silt loam	15.00	4	6.38	5	5.58
A. Wigno	Silt loam	9.13	4	5.08	5	6.29
Averages				5.57		5.81

NOTE.—Rainfall at Red Bluff November 1, 1912, to October 31, 1913, 1.16 feet.

TABLE No. 8.

Summary of Results of Alfalfa Duty of Water Investigations, Los Molinos Area, 1914.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
E. A. Bundy, No. 1	Silt, clay loam	8.97	4	2.34	5	5.78
E. A. Bundy, No. 2	Silt loam	4.31	4	4.10	5	8.40
O. W. Chambers	Gravelly clay loam	3.08	6	1.42	6	4.44
G. B. Engle	Light gravelly clay loam	23.35	6	3.46	5	4.85
G. H. Geer	Clay loam	9.21	4	6.56	5	6.06
J. F. Hofhenke	Silt loam	13.27	4	8.46	5	5.75
	Silt loam	11.32	4	5.55	5	
S. B. Reece	Clay loam	13.50	4	5.47	5	5.68
A. Wigno	Silt loam	6.70	4	6.08	5	6.68
H. N. Woodward	Silt, clay loam	9.08	4	3.95	5	8.31
Averages				4.74		6.22

NOTE.—Rainfall November 1, 1913, to October 31, 1914, 2.74 feet.

DESCRIPTIONS OF FIELDS IN THE LOS MOLINOS AREA AND COMMENTS ON IRRIGATION CONDITIONS AND PRACTICES.

E. A. Bundy Field No. 1. Seeded in 1911. Stand of alfalfa fair. Field divided into seven border checks 80 to 90 feet by 630 feet, with average grade of four inches in 100 feet. Slope across some of checks is uneven, giving unequal distribution of water over surface. Small irrigation heads, ranging from one and one-half to two cubic feet per second, used, requiring more than two days to complete irrigation. Increased yields could have been obtained by better management, particularly by cutting alfalfa at proper time.

E. A. Bundy Field No. 2. Seeded in 1909. Stand of alfalfa good. Field divided into two parts by distributing ditch and every 30 to 40 feet cuts made in ditch bank through which water passes to field. Distribution not uniform over surface, owing to high spots. Irrigation heads of one to two cubic feet per second applied once after each cutting, except fifth.

R. W. Ballard Field. Seeded in 1907. Stand fair but becoming thin in scattered spots. Field has not been checked and is irrigated by flooding from field ditches, which gives an unequal distribution. Irrigation head usually two and one-half to three and one-half cubic feet per second. Amount of water used on this field could be reduced materially by preparing the land in border checks. Several crops damaged by grasshoppers.

G. B. Engle Field. Seeded in 1911. Stand of alfalfa fair but field rather poorly prepared for irrigation. Irrigation head of one to two cubic feet per second divided into one or two checks varying greatly in size but averaging about 30 by 300 to 600 feet. Grasshoppers reduced yield in 1913.

G. H. Geer Field. Seeded in 1908. Field had excellent stand of alfalfa and considerable care exercised in preparing for irrigation. Border checks of 60 feet by 310 feet with average grade of about three inches in each 100 feet. Usual practice was to turn about five cubic feet per second into one or two checks. Excessive use of water due largely to the irrigator and abundance of water.

S. B. Reece Field. Seeded in 1908. Field had fair stand of alfalfa but not very well prepared. Checks rectangular, ranging from about one-fifth to three-fourths acre in extent. Average irrigation head of five cubic feet per second divided among two or three checks. Field was leased to tenants who did not exercise the best of care in applying water or in handling crop.

J. H. Hofhenke Field. Seeded in 1911. Stand excellent and land well prepared in border checks 40 feet by 400 to 450 feet, with average grade of five inches per 100 feet. Usually five cubic feet per second was divided between two checks.

A. Wigno Field. Seeded in 1911. Stand of alfalfa good, but land not very well prepared for irrigation. Field irrigated by flooding from field ditches, head varying from four to five cubic feet per second.

John Risse Field. Seeded in 1909. One of the oldest fields in the area and stand becoming thin. Field irrigated by flooding from field ditches with average head of five cubic feet per second. Distribution of water not uniform owing to slight irregularities in ground surface.

H. N. Woodward Field. Seeded in 1911. Stand good and land very well prepared for irrigation, except about one-fourth acre in northwest corner of field. Average irrigation head of five cubic feet per second usually divided between two border checks 60 feet by 330 feet.

O. W. Chambers Field. Seeded in 1911. Stand good and field well prepared in border checks 50 feet by 500 to 600 feet, with average grade of about two inches per 100 feet. Usually head of about one cubic foot per second turned into a single check.

Orland Area.

Investigations were conducted on five farms in the Orland area in 1913 and on eight farms in 1914, one of the latter, however, being part of one of the fields studied in 1913. (Fig. 9.) All of these fields lie within the Orland project of the Reclamation Service and the project manager assisted materially in the conduct of the work.

The Orland project comprises about 20,000 acres in Glenn and Tehama counties, of which 7,354 acres were irrigated in 1914. The average rainfall at Orland is 19.23 inches.[1] Irrigation water is obtained by the Orland project from Stony and Little Stony creeks, the direct flow being used when available in the early season, and storage at East Park Reservoir on Little Stony Creek being drawn on later. During the seasons of 1913 and 1914, owing to the fact that the project had not been opened formally by the Secretary of the Interior, irrigation water was supplied at a flat rate of $2 per acre. The land in the project, as thus far irrigated, is largely of gravelly nature, which, with an average slope toward the southeast, of 10 to 15 feet to the mile, supplied adequate drainage. Owing to the gravelly character of the land under irrigation, up to the end of 1914, when more land was taken in, it was found impractical to trace the underground movement of the irrigation water applied, with the exception of the O'Hair farm, on which observations of this nature were made in both 1913 and 1914. All measurements of use in the investigations were made by means of Cipolletti or rectangular weirs, and automatic registers were installed on six of the farms. All of the land in the Orland project is in private ownership. Up to 1914 the average individual cropped area was 22 acres. Alfalfa, the only crop covered in the investigation, is the principal crop grown, although practically all of the fruits raised in California are grown commercially to more or less extent in this project.

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[1] Weather Bureau, Annual Summary for 1915.

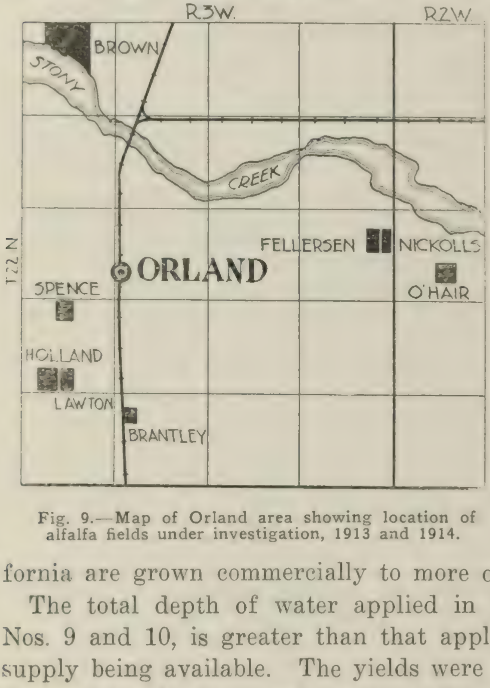

Fig. 9.—Map of Orland area showing location of alfalfa fields under investigation, 1913 and 1914.

The total depth of water applied in 1914, as indicated in tables Nos. 9 and 10, is greater than that applied in 1913, due to a larger supply being available. The yields were larger in 1914 than in 1913, due both to this increased supply and probably also to the very much larger rainfall in 1914. The widest variation in relation between the amount of water applied and the crop yield occurred on the Lawton farm, where 4.29 acre-feet of irrigation water per acre and .82 foot of rainfall produced 5.29 tons of alfalfa in 1913, whereas 9.59 acre-feet of irrigation water and 2.39 feet of rainfall in 1914 increased the yield over 1913 only about 10 per cent. Soil moisture determinations are not necessary in cases of this kind to indicate the needless waste of applying so much water as was applied to the Lawton field in 1914. Fortunately the excessive use in 1914 was but the temporary practice of a renter.

The tracing of the underground distribution of the irrigation water applied in the Orland area was confined to the O'Hair field (Fig. 10), the other fields being eliminated from this work because of the gravelly nature of the soil. The soil of the O'Hair tract lies near the border line between a silt loam and clay loam and is somewhat impregnated with fine gravel at a depth of three to five feet, a coarser gravel being sometimes encountered at a depth of about eight feet.

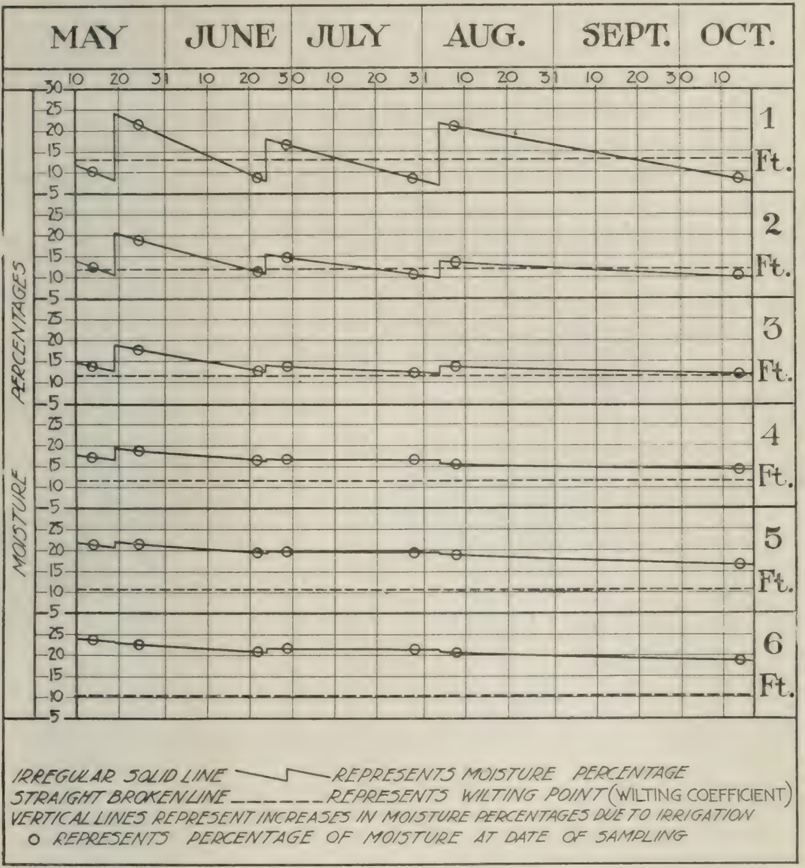

Fig. 10.—Diagram showing seasonal variation in soil moisture percentage, O'Hair alfalfa field, Orland, 1914.

Owing to changing from the sun-dried to the oven-dried method of making moisture determinations, the work of this nature in 1913 was not conclusive. The field received three irrigations in 1914 and nine borings for moisture determinations were made to a depth of six feet before and after each irrigation. In the first irrigation a depth of

6.24 inches was applied, of which the upper six feet retained 3.58 acre-inches per acre, or 57 per cent of the amount applied. Of this about one-half was retained in the surface foot. At the second irrigation a depth of 3.18 inches was applied, of which 2.11 acre-inches per acre, or 66 per cent, was retained in the upper six feet, nearly two-thirds of this remaining in the surface foot. In the third irrigation, a depth of 3.24 inches was given, of which approximately two-thirds remained in the upper six feet, nearly all of this remaining in the surface foot.

The striking condition brought out by the moisture borings in the O'Hair field was that, while the percentage of the irrigation water applied retained in the soil decreased with the depth, the amount of moisture in the soil before irrigations actually increased with the depth, apparently due to the capillary rise of ground water, which stood seven to nine feet below the surface. As a whole, the moisture percentages in the upper three feet of soil did not vary widely from the amount necessary to prevent wilting, and below three feet it was at all times well above the wilting point.

TABLE No. 9.

Summary of Results of Alfalfa Duty of Water Investigations, Orland Area, 1913.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
David Brown	Gravelly clay loam	76.45	7	4.73	[1]3	3.98
C. E. Fellerson	Coarse gravel impregnated with silt and wash loam	32.45	9	2.83	[2]4	4.44
H. M. Lawton	Coarse gravel impregnated with loam	18.61	9	4.29	[2]4	5.29
Roy O'Hair	Silt loam	34.20	5	3.16	[2]4	6.40
A. C. Spence	Coarse gravel impregnated with silt and wash loam	8.06	10	3.91	[2]4	4.35
Averages, not counting field injured by caterpillars				3.55		5.12

[1] Fourth crop destroyed by caterpillars.

[2] Only four crops cut, due to shortage of water.

NOTE.—Rainfall November 1, 1912, to October 31, 1913, 0.82 foot.

TABLE No. 10.

Summary of Results of Alfalfa Duty of Water Investigations, Orland Area, 1914.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
David Brown	Gravelly clay loam	76.45	7	5.04	5	5.49
R. F. Brantley	Clay loam	7.75	18	4.03	5	6.13
C. E. Fellerson	Coarse gravel impregnated with silt and wash loam	14.79	8	2.59	5	5.87
H. M. Lawton	Coarse gravel impregnated with loam	18.61	13	9.59	5	5.84
E. F. Nicholls	Coarse gravel impregnated with silt and wash loam	16.66	9	3.25	[1]4	5.26
J. E. Holland	Coarse gravel impregnated with loam	37.00	13	7.56	5	6.26
Roy O'Hair	Silt loam	34.20	3	1.04	[1]4	7.17
A. C. Spence	Coarse gravel impregnated with silt and wash loam	27.70	10	5.56	Pasture	--------
Averages, not counting fields partially or wholly pastured		--------	--------	5.76	--------	5.92

[1] Crop pastured after fourth cutting.

NOTE.—Rainfall November 1, 1913, to October 31, 1914, 2.39 feet.

DESCRIPTIONS OF FIELDS IN ORLAND AREA AND COMMENTS ON IRRIGATION CONDITIONS AND PRACTICES.

David Brown Field. Seeded in 1909. Land in contours, average difference of elevation between checks being seven inches. In many places uneven grading was cause of scattering and poor growth of alfalfa. Variation in character of soil also had a marked effect upon yield, particularly in south half of field, where soil is compact and in spots quite impervious to water. Average head of water delivered varied from four to eight or nine cubic feet per second, divided so that about one to two cubic feet per second was used on each check. Seven irrigations given each year, 1914 showing slight increase in total application over 1913.

R. F. Brantley Field. Seeded in 1912. Stand of alfalfa fair. Field in square checks having average length and width of about 150 feet. The compact clay loam soil is typical of the project, requiring light, but frequent, irrigations. Water applied every eight or ten days throughout irrigation season, with total of 18 applications. Average amount of water applied each time was a little less than three acre-inches per acre. Soil sampling showed that in some parts of the field water penetrated only from 12 to 15 inches, while in other parts there was a fairly uniform moisture distribution to depth of six feet. A short growth of alfalfa always showed spots where moisture was deficient.

Fellerson-Nicholls Fields. Seeded in 1909. In 1913 this tract was subdivided, the east half being purchased by E. F. Nicholls, so that in 1914 records were kept of each piece separately. Stand of alfalfa good. Field originally prepared in border checks 20 to 40 feet by 100 to 1,400 feet, but by constructing a new head ditch through middle of field the maximum length of checks was reduced to 700 feet. Average irrigation head varied from five to seven cubic feet per second, divided into two or three checks. The greater use of water on Nicholls field is attributed largely to lack of experience of the irrigator.

H. M. Lawton Field. Stand of alfalfa good. Field in square checks averaging about one-fifth acre each. The soil of this tract is so well aerated and drained that irrigation can be followed almost immediately by the mower. Field irrigated 13 times in 1914 at intervals of 12 to 14 days, with average irrigation head of 10 to 12 cubic feet per second. Persons who rented this field in 1914 were careless in handling water and used more than necessary.

J. E. Holland Field. Seeded in 1910. This field lies immediately west of Lawton field and has good stand. Field was irrigated about every 14 days with average head of 9 to 11.5 cubic feet per second turned into one or two checks having an average area of one-fifth acre. This proved the most economical way of applying water. Field is so well drained and soil so porous that the water of an irrigation immediately disappears; it was not unusual for owner to cut alfalfa within a half day after water was applied.

Roy O'Hair Field. Seeded in 1910. Stand excellent. Field in border checks about 40 feet by 300 to 1,250 feet, with average grade of 2½ to 3½ inches in 100 feet. Average irrigation head of 7½ cubic feet per second was turned into two or three checks. During 1914 water table was five to six feet below surface, but in the previous year was at depth of eight feet. It was customary to irrigate this field once after each cutting, but in 1914 owner, being afraid of the rising water table, irrigated only three times in the season. Fifth crop of alfalfa was pastured.

A. C. Spence Field. Seeded in 1912. Stand of alfalfa fair. Field in checks about 100 feet square so arranged in relation to field ditches that an irrigation head of five to eight cubic feet per second can be admitted directly into each check. Owing to the extreme porosity of soil, there was little growth of alfalfa on any part of field except that actually receiving water at each irrigation. Two years studies on this tract showed that unless at least five cubic feet per second is turned on a check of coarse gravelly soil, much of water will be lost through percolation before check is covered.

Willows Area.

Investigations were conducted in this area on six farms in 1914, of which five received water from Central Canal. (Fig. 11.) The work was confined to certain heavy types of soil not represented in the investigations elsewhere in the valley and work was hardly under way in 1914 before the fact was revealed that much difficulty was being experienced in getting water to penetrate the soil. The heavy soils encountered are classified in the Soil Survey as Tehama clay and clay loam.[1] These soils are all of compact structure and inclined to be refractory, very sticky when wet, and subject to hard baking in drying. In local areas, drainage is poor and in winters of heavy rainfall considerable damage is done to alfalfa fields by standing water. In some cases in 1914 it was found immediately after irrigation that water which irrigators supposed was penetrating sufficiently deep to meet all water requirements of the plants was in fact penetrating to depths of only 10 to 12 inches below the surface.

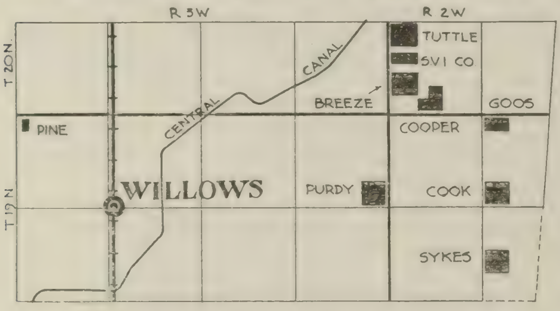

Fig. 11.—Map of Willows area showing location of alfalfa fields under investigation, 1914 and 1915.

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[1] U. S. Dept. Agr., Bureau of Soils, Reconnoissance Soil Survey of the Sacramento Valley, California.

The average rainfall at Willows, over a three-year period only, is 16.55 inches.[1] Water carried by Central Canal is obtained by pumping from Sacramento River, except that in the spring and early summer the supply comes from the flood flow of Stony Creek. In 1914 the charge for water was 90 cents per acre and in 1915 it was $1.50 per acre, regardless of time and amounts of application. In general, the border method of preparing land for alfalfa has been followed here, the checks usually being 30 to 60 feet wide and 400 to 800 feet long, with a drain ditch usually provided in the best fields at the lower ends of the checks. Heads of water delivered to the irrigators ranged from three to seven cubic feet per second. In 1914 there was no uniformity in the number of applications given alfalfa, some watering four times and others ten times.

The difficulty encountered in obtaining sufficient moisture penetration in the heavy Willows soils in 1914 suggested the desirability of a continuation of the investigations through the season of 1915 under conditions that would be typical, and where it would be possible to vary the method and time of application. Accordingly, a suitable field was selected five and one-half miles northeast of Willows, and while this work was going on at this field, observations of use alone also were made on four other fields, as reported in Table No. 12.

As compared with the amounts of water used and the result in yields of alfalfa on the other farms under observation in the valley during these investigations, both the use and the yields on the soils under observation about Willows were low—an average use of 1.83 acre-feet of water per acre and an average yield on six farms in 1914 of 4.82 tons per acre. It is to be noted from tables Nos. 11 and 12 that in no case was more than 1.97 acre-feet of water applied, and that in no case, so far as measured, did the yields obtained exceed 5.39 tons per acre. The reasons for these results are not difficult to find when account is taken of the soil moisture determinations made in 1914 on the Purdy, Tuttle, and Pine fields, and in 1915 on the special experimental field northeast of Willows.

Purdy Field. The soil in this field is classed as Tehama clay and is unusually compact. The field was irrigated four times in the season. Three borings for soil moisture determinations were made before and after the first irrigation, eight before and after the second irrigation, and six before and after the third and fourth irrigations. Of the 7.08 inches in depth applied in the first irrigation about 12 per cent entered and was retained in the upper three feet of soil, of which about 11 per cent was in the upper foot. In other words, practically no moisture penetrated below 12 inches. In the second irrigation a depth of 4.56

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[1] Weather Bureau, Annual Summary for 1915.

inches was applied, nearly all of which penetrated the soil and of which about 45 per cent remained in the upper foot. In the third irrigation a depth of 4.80 inches was applied, of which approximately one-third remained in the upper foot, with no increase below the second foot. The moisture determinations before and after the fourth and last irrigation, when a depth of 3.84 inches was applied, indicated that the soil became more impervious to water as the season advanced, for about 66 per cent of the amount applied was retained in the first foot, with no significant increase below that.

In comparing the amount of moisture in the surface foot of soil in this field with the amount necessary to maintain plant growth without witling (Fig. 12), it is found that the variation was from three or four per cent below to five or six per cent above that amount through the

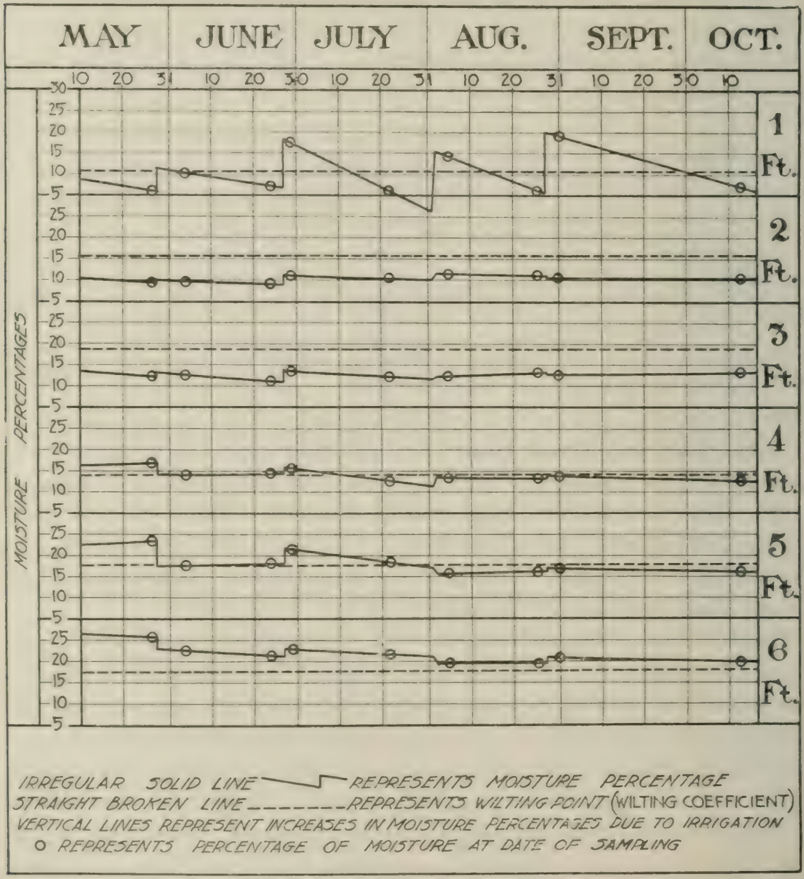

Fig. 12.—Diagram showing seasonal variation in soil moisture percentage, Purdy alfalfa field, Willows, 1914.

season. At no time in the season was the moisture percentage in the second and third foot sections sufficient in itself to prevent wilting, averaging about four per cent below, but at depths of four to six feet there was almost enough to do so.

The most rapid growth of alfalfa in this field occurred during May, when the second crop was being produced. After this the rate of growth decreased continuously, until at the time of the fourth crop. These facts as to growth, taken with the low yield, add to the evidence that the crop suffered through failure of the irrigation water to penetrate the soil below the first foot or two.

Tuttle Field. The soil is similar to that of the Purdy field, but slightly coarser in texture and a little more open and permeable. Moisture determinations were made from ten borings before and after the second irrigation and from nine before and after the third irrigation, a depth of 4.08 inches being applied in the first case, and of 4.16 inches in the second and third. At the second irrigation 93 per cent of the water applied was found to enter the first three feet of soil, about one-half being retained in the first foot. In the third irrigation 44 per cent was retained in the first six feet, three-fourths of which remained in the first foot.

Pine Field. The soil in this field is classed as Willows clay adobe, which was found to be less impervious to water than the Tehama clay of the Purdy and Tuttle fields, and less difficult to handle. Moisture determinations were made from six borings before and after each of the second, fourth and sixth irrigations, the depth of water applied at these irrigations having been 2.40, 3.72, and 4.32 inches, respectively. At the second irrigation all of the water appeared to be held in the first six feet, with approximately one-half retained in the first foot. Of the fourth irrigation about 60 per cent entered the upper six feet, and of this 49 per cent remained in the surface foot. In the case of the sixth irrigation 90 per cent was found to enter the upper six feet, of which nearly one-half again remained in the surface foot.

Experiments in 1915.

In continuing the study on a typical field in 1915 the plan adopted was to give equal total applications of irrigation water to all plats under observation, but to vary the time, depth, and frequency of irrigations. The land used in the experiment was furnished rent free by the local irrigation company, together with irrigation water, while this office met the full expense of the field investigation. The field utilized in this study, with roadways and main canal eliminated, comprised 8.75 acres of alfalfa divided into 21 border checks 60 feet by 300 feet, with an average grade of four inches per 100 feet, and with an average area

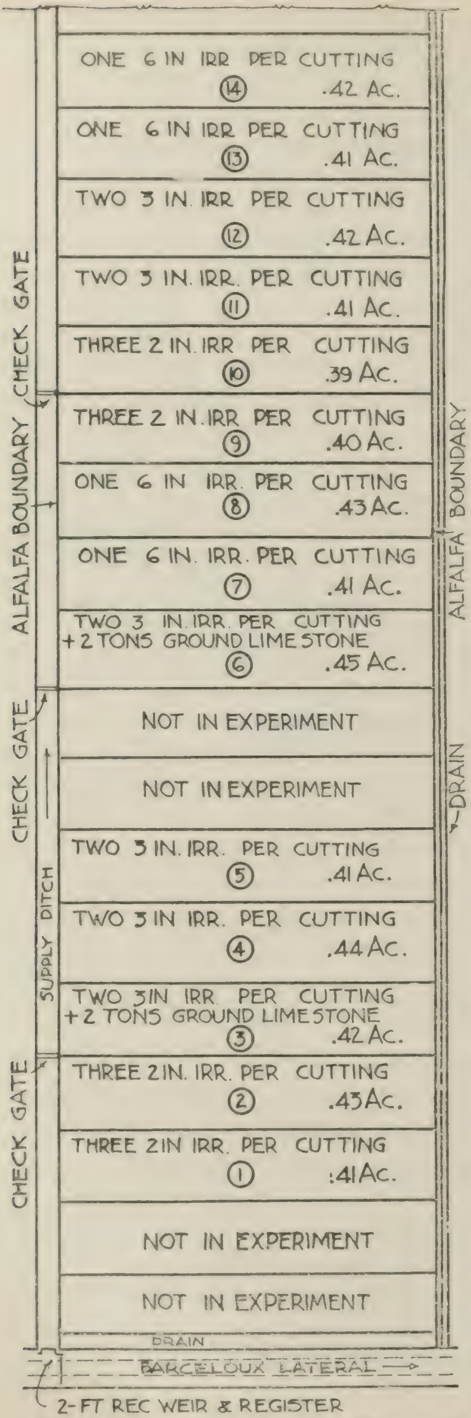
ONE 6 IN IRR PER CUTTING ⑭ .42 Ac.
ONE 6 IN IRR PER CUTTING ⑬ .41 Ac.
TWO 3 IN. IRR PER CUTTING ⑫ .42 Ac.
TWO 3 IN. IRR. PER CUTTING ⑪ .41 Ac.
THREE 2 IN. IRR PER CUTTING ⑩ .39 Ac.
THREE 2 IN. IRR PER CUTTING ⑨ .40 Ac.
ONE 6 IN IRR. PER CUTTING ⑧ .43 Ac.
ONE 6 IN. IRR. PER CUTTING ⑦ .41 Ac.
TWO 3 IN. IRR. PER CUTTING + 2 TONS GROUND LIMESTONE ⑥ .45 Ac.
NOT IN EXPERIMENT
NOT IN EXPERIMENT
TWO 3 IN. IRR. PER CUTTING ⑤ .41 Ac.
TWO 3 IN IRR. PER CUTTING ④ .44 Ac.
TWO 3 IN IRR PER CUTTING + 2 TONS GROUND LIMESTONE ③ .42 Ac.
THREE 2 IN. IRR. PER CUTTING ② .43 Ac.
THREE 2 IN IRR. PER CUTTING ① .41 Ac.
NOT IN EXPERIMENT
NOT IN EXPERIMENT
DRAIN
BARCELOUX LATERAL
2-FT REC WEIR & REGISTER
ALFALFA BOUNDARY
CHECK GATE
CHECK GATE
CHECK GATE
SUPPLY DITCH
ALFALFA BOUNDARY
DRAIN

Fig. 13.—Plat of experimental tract, Willows, 1915.

per check of 0.42 acre (Fig. 13.) A drain ditch parallel with the head ditch cared for surface run-off from the lower ends of the checks. The alfalfa was seeded in 1911, following many years of dry grain cropping, and while the stand was not good at the time of these experiments, it was one of the best that could be found on the compact soils of the neighborhood, and, in general, was representative of many alfalfa fields of the locality. At the lower ends of the checks small areas of alfalfa had been killed in previous years by standing water, and these small areas and a considerable number of bare places on the levees and parts of the checks where the stand was comparatively thin were partially responsible for the low yields obtained. Except for the wide distances between the check levees, the field was well prepared for irrigation.

The soil in this field, which is classed as a Tehama clay loam, is grayish in color and of compact structure and refractory nature. When wet it is sticky, and upon drying becomes very hard, but does not check or crack. It is free from both hardpan and gravel and little difference is noticeable between the soil and subsoil. This type of soil was selected because the soil survey maps indicate the presence of about 45,000 acres of it in Sacramento Valley, very largely east of Willows in the area surrounding this field.

The amount of water used on each of the plats during the season was two acre-feet, an average irrigation head of 2.82 cubic feet per second being generally divided between two checks, although various other sizes of heads were tried. One-third of the twelve checks under observation were irrigated with a depth of six inches, once for each cutting except the last, one-third received two three-inch irrigations between cuttings applied just before and just after the crop was removed, and one-third received three two-inch irrigations, at intervals of about 12 days. (Plate II, Fig. 1.) All of the water entering the field was measured by a 2½-foot rectangular weir and automatic register. (Plate II, Fig. 2.)

For the purpose of increasing, if possible, the perviousness of the soil to water, two checks were treated with ground limestone at the beginning of the season at the rate of four tons per acre. It was not expected that these checks would show much change the first year and they did not. The largest annual yield of alfalfa, 5.07 tons per acre, was obtained from the checks receiving three two-inch irrigations per cutting, an increase of 18 per cent over the lowest yields, 4.42 tons per acre, being secured from the checks that received two three-inch irrigations per cutting, and lowest yield, 4.29 tons per acre, coming from the checks irrigated with one six-inch irrigation per cutting.

While the above increases of yield indicate the desirability of more than one irrigation per cutting, the differences in the one season of investigations were not great. It was evident to those in the field, however, that the more frequent the application of water, the better the moisture condition of the soil. Borings for soil moisture determinations were difficult, except immediately after irrigations, and even then difficulty was encountered below the first foot of soil. Including the 12 plats, a total of 3,408 moisture determinations were made before and after irrigations, and while the chief value of these is in the larger understanding they give of the character of these compact soils, especially with reference to the permeability to irrigation water, they substantiate, to the extent reasonably to be expected, the better results due from the more frequent applications of irrigation water.

In order to gain an idea of the root development of the alfalfa in this field a hole about six feet square and three feet deep was excavated. This also afforded a good view of the cross section of the soil formation. The roots of the plants were carefully removed. It was found that the taproots of the alfalfa were not over one-half inch in diameter and did not extend below a depth of three feet. The main mass of the roots was concentrated in the upper two feet of soil. The fact that the greater part of the alfalfa plants in this particular field are shallow-rooted is attributed largely to the compact structure of the soil, making moisture penetration difficult.

After removing the soil for root examination some rather surprising results were found in tests made by filling the hole from which they came with water and noting the time required for downward and lateral percolation. Twenty-four hours after the hole had been filled to a depth of three feet there remained in the hole two feet of water. Two weeks later there still remained one foot. Holes two inches in diameter and four feet deep bored 12 inches away from the large test hole showed no lateral percolation. In holes bored six inches from the test hole a slight amount of water had seeped through after 12 hours. Later another hole was excavated in a different part of the field and similar trials made, practically the same results being secured as in the first test. These tests serve to show the impermeability and peculiar physical conditions of the soil represented in this field.

TABLE No. 11.

Summary of Results of Alfalfa Duty of Water Investigations, Willows Area, 1914.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
P. S. Cook	Silty clay loam	15.65	9	1.68	[1]3	1.71
C. F. Goos	Silty clay loam	13.00	10	1.83	5	5.32
L. E. Tuttle	Silty clay loam	35.06	4	1.28	[1]3	3.93
V. E. Breeze	Silty clay loam	35.95	6	1.79	[1]3	1.63
Jas. Purdy	Silty clay	11.37	4	1.69	5	3.75
W. B. Pine	Clay adobe	3.34	7	1.97	4	5.39
Averages, not counting fields pastured				1.83		4.82

[1] Crop pastured after third cutting.

NOTE.—Rainfall November 1, 1913, to October 31, 1914, 2.39 feet.

TABLE No. 12.

Summary of Results of Alfalfa Duty of Water Investigations, Willows Area, 1915.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet
C. F. Goos	Silty clay loam	13.00	7	1.62
L. E. Tuttle	Silty clay loam	35.06	5	1.75
Geo. Cooper	Silty clay loam	3.01	7	1.53
H. J. Sykes	Silty clay loam	15.60	7	1.94
Average				1.71

NOTE.—Rainfall November 1, 1914, to October 31, 1915, 2.09 feet.

PLATE II.

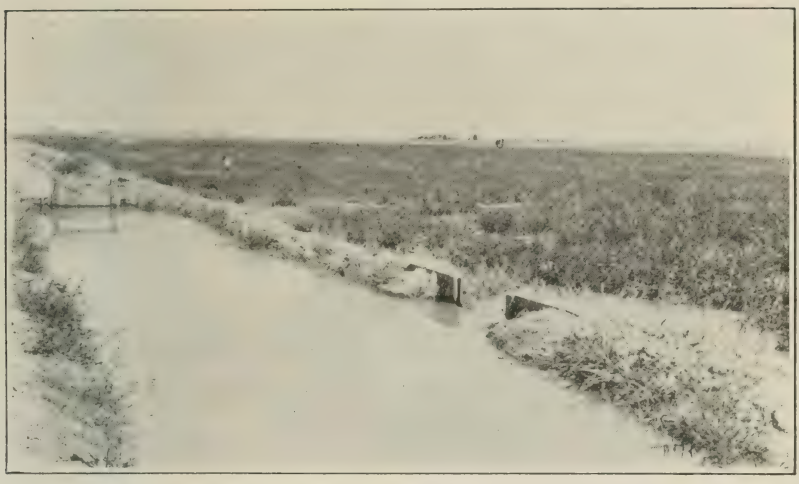

Fig. 1.—Irrigation of alfalfa on Willows experimental tract, 1915.

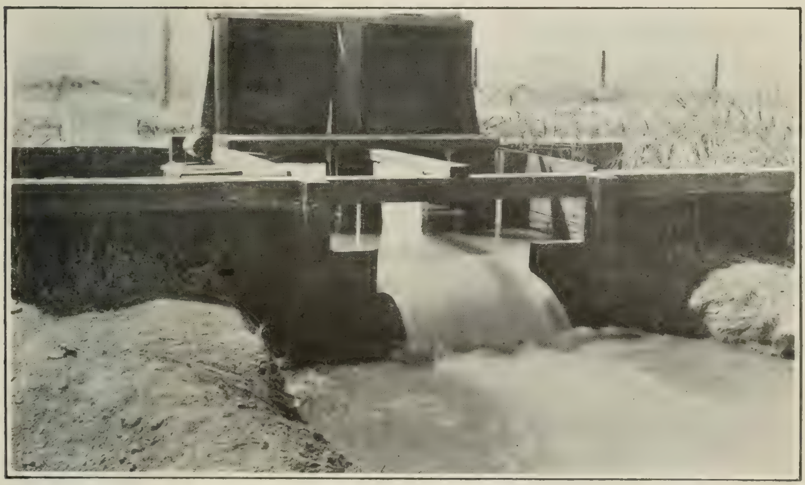

Fig. 2.—Weir and water register, Willows experimental tract, 1915.

DESCRIPTIONS OF FIELDS IN THE WILLOWS AREA AND COMMENTS ON IRRIGATION CONDITIONS AND PRACTICES.

P. S. Cook Field. Seeded in 1912. Stand thin in spots but compares rather favorably with other fields in the vicinity. Field irregular in shape and is divided into border checks 40 to 80 feet wide and from 200 to 700 feet in length, with average grade of 3 inches per 100 feet. An irrigation head of 3.5 to 6 cubic feet per second divided between two and four checks. Miscellaneous borings after irrigation showed little moisture below a depth of 12 to 15 inches.

C. F. Goos Field. Seeded in 1911. Stand comparatively good. Land in border checks 40 feet by 600 feet with average grade of 12 inches per 100 feet. Grade is excessive for heavy soil found here. Average heads of five to six cubic feet per second divided into two or four checks. Much care used in irrigating and only enough water added to reach lower end of checks without surface waste.

L. E. Tuttle Field. Seeded in 1907. Stand is among the best in area. Field has not been checked, irrigation being carried on by flooding from field ditches 200 feet apart. Portable canvas check gates are used to back up water in field ditches and are so placed that water spreads over a distance of about 200 feet at one time. Heads of four to seven cubic feet per second were divided into two ditches.

V. E. Breeze Field. Seeded in 1907. This field had been utilized for pasture for several seasons and stand was rather poor. Contour method used, checks ranging from three-fourths acre to two acres. Distribution of water over field uneven owing to poor grading. Average head of three cubic feet per second used and sometimes divided into three or more streams.

James Purdy Field. Seeded in 1912. Stand uneven and has been damaged in various spots by water standing on surface and poor drainage. Land in border checks 30 feet by 650 feet with average grade of about two inches per 100 feet. Heads of two or four cubic feet per second were used, one cubic foot per second usually being turned into each check. Despite the fact that small heads were permitted to run a long time over the land, it was difficult to place any appreciable amount of water below a depth of 12 to 15 inches.

W. B. Pine Field. Seeded in 1913. Stand good and land well prepared in border checks 30 feet by 400 feet, with average grade of about nine inches per 100 feet. Water was obtained from small pumping plant and an average flow of .3 to .45 cubic foot per second was turned into a single check. Moisture determinations showed that a more uniform distribution of water probably could be attained either by increasing the discharge from the well or by reducing the length of the checks.

George Cooper Field. Seeded in 1914. Stand comparatively good and land fairly well prepared in border checks 40 feet by 622 feet, with average grade of five inches per 100 feet. An average head of one and one-half cubic feet per second was turned into a single check.

H. J. Sykes Field. Seeded in 1913. Stand not uniform, there being small areas, especially at lower end of checks, where crop has been drowned. Land is in border checks 40 feet by 600 to 950 feet, with average grade of two and one-half inches per 100 feet. An average irrigation head of four to five cubic feet per second was divided among two or three checks. Difficulty was experienced in getting water to penetrate soil to any considerable depth.

Woodland Area.

Woodland is situated south of Cache Creek, in Yolo County, on the west side of Sacramento Valley. The mean annual rainfall at Davis, nine miles south, is 17.23 inches.[1] The water supply for irrigation is derived from Cache Creek by gravity and pumping, and by pumping from wells and from Willow Slough. Cache Creek forms the only outlet to Clear Lake, wherein it is proposed to store a large supply of water for power and irrigation by means of a dam recently completed. At the time the duty of water investigations were being conducted this dam had not been completed and only the direct run-off was available. The company controlling the Cache Creek supply diverts water from Cache Creek in three places, that for the immediate Woodland section being taken out at Moore Dam, about seven miles west of Woodland. Water is delivered in rotation at $1.50 per acre-foot. Measurement is made in submerged-orifice boxes, or by current meter or surface float. Considerable pumping development has taken place in the area since early in 1911, at which time electric power came into general use in this section, and during the four years ended with 1914, 77 pumping plants were installed for irrigation. The soils, which are residual from Cache Creek, consist of the Yolo series as mapped by the Bureau of Soils and the University of California and range from fine sandy loams to clay loams.[1] Alfalfa is the principal crop grown under irrigation. The average of 22 yields in 1913 and 1914 distributed among five cuttings was 1.84, 1.51, 1.10, 1.22 and .59 tons per acre, respectively, a total of 6.26 tons per acre. The relatively low average for the third cutting was caused by grasshopper devastations in 1913 and in some instances by failure to irrigate until after the third cutting in 1914. Prunes usually are irrigated every year, but other fruits and grain are irrigated only in years of deficient rainfall.[2]

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[1] Weather Bureau, Annual Summary for 1915. A record kept at Woodland by the Weather Bureau from 1873 to 1909 gave a mean of 17.73 inches.

The number of irrigations in a season around Woodland is normally dependent directly upon the preceding winter's rainfall, and the practice is to begin irrigation with the first, second or third crop of alfalfa, according to the dryness or wetness of the season, and to irrigate each crop thereafter, usually as soon as the preceding crop has been removed. The abnormally light rainfall in 1912–1913 had two different effects upon irrigation practice; it made irrigation necessary to mature even the first crop of alfalfa, and it caused the water supply to run short in the summer. Water was abundant early in the season and could be had practically on application, but later the very small quantity available had to be rotated among many irrigators, with the result that some crops were half grown before irrigation and others received no water at all. This, of course, had the effect of diminishing the yields of hay. Following a winter of very heavy rainfall, however, the first and second crops in 1914 were grown without irrigation, and water was plentiful throughout the season. Nevertheless, owing to the low price of hay, most growers irrigated only once or twice in 1914 and some not at all, whereas the normal practice would have been to irrigate after the second, third and fourth cuttings. Of the fields under observation the only ones irrigated three times were supplied by pumping plants. Thus the possible increase in yields due to a better water supply was curtailed.

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[1] U. S. Dept. Agr., Bureau of Soils, Reconnoissance Soil Survey of the Sacramento Valley, California.

[2] Investigations made of grain irrigation in this area in 1913 and 1914 showed a total of 2,419 acres of barley, oats, and wheat irrigated in 1913 as a result of deficiency in rainfall, and only 12 acres irrigated in 1914 after a winter of very heavy rainfall. An average of 1.11 acre-feet per acre was applied in 1913, generally in one irrigation, and the average yield of grain was 23 sacks per acre from irrigated fields and about 8 sacks per acre from unirrigated fields. In 1914 the average yield from the same tracts unirrigated was 22 sacks per acre. Thus with a relatively small additional expenditure the yield in 1913 was more than doubled by irrigation and was made to equal that in 1914, a season of abundant precipitation and normal growing conditions.

The border check is the most common type in this area. The checks are usually 40 to 60 feet wide and 650 to 1,300 feet long, depending upon the shape and size of the field, with a single supply ditch skirting the higher end, but with occasionally a cross lateral located halfway down. Under pumping plants with their smaller heads of water, checks generally are 20 to 35 feet by 100 to 600 feet. The grade of checks varies normally from 1.8 to 4.8 inches and averages about three inches in 100 feet. Levees vary in height from nine inches to two feet and in width from 6 to 12 feet. Field laterals under the gravity system are large, almost invariably measuring 18 feet from center to center of ditch banks, with the ditch bottom about one foot below the adjoining field level. Check gates are of both wood and concrete and usually from six to eight feet wide in order to admit large heads of water, to insure more rapid spreading, and relieve the pressure of water on the ditch banks. The heads of water delivered to individual farms are among the largest in California, ranging normally from 10 to 20 or 25 cubic feet per second, but these quantities usually are divided among two or three checks. The size of head is limited in times of water abundance only by the capacity of the field lateral. Canvas dams are used in the farm ditches for diverting water into the checks, a check 650 feet long and of average grade requiring about an hour to irrigate. Usually two men are employed in irrigating a field of 20 acres and an extra man where fields are larger.

Duty of water observations were made in the Woodland area in 1913 on 12 fields of alfalfa (Fig. 14), one prune orchard and one grain field. In 1914 the investigations were confined to alfalfa, and although the total number of alfalfa fields under observation was less in 1914 than in 1913, several were divided into plats and a separate study made of each plat, so that the effective number of fields in 1913 was 13. Measurements of the heads of water used were made in all cases under the canal system and under the Jackson-Woodard pumping plant by current meter, in most cases in flumes. Under the Fisher pumping plant, measurements were made with a rectangular weir.

Speaking generally regarding the results of measurements of use in the Woodland area, it can be said that because charges for irrigation

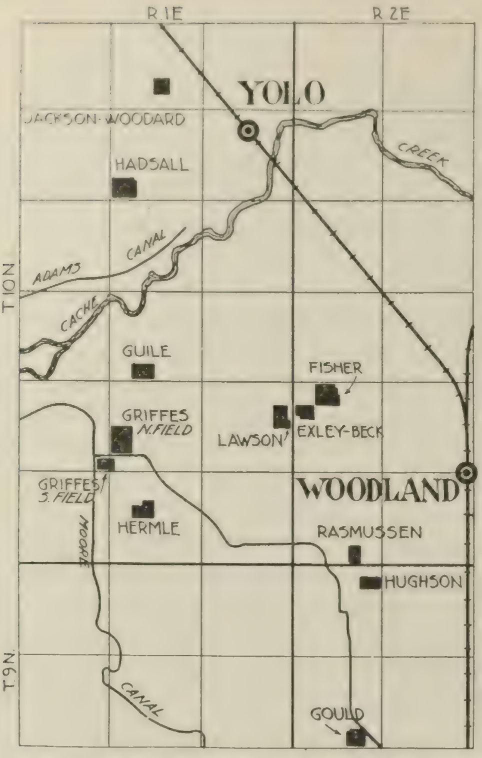

Fig. 14.—Map of Woodland area showing location of alfalfa fields under investigation, 1913 and 1914.

water are based directly on the quantities used rather than on the number of acres irrigated, irrigators seem more inclined to irrigate with reference to the immediate profits to be obtained for each crop than under any of the other gravity systems included in the investigation. In years of normal rainfall and for a limited number of years, fairly satisfactory crops of alfalfa are obtained around Woodland without irrigation, and when the market price of alfalfa is not high farmers frequently do without more than one or two waterings. The average total application in 1913 was 2.94 acre-feet per acre, the rainfall for that year having been 0.61 foot and the price of alfalfa relatively high. The average application per irrigation that year was 0.85 acre-foot per acre. In 1914, when the seasonal rainfall was 2.45 feet and the price of alfalfa was low, the average total application was only 1.80 acre-feet per acre, with the average application at single irrigations 0.99 acre-foot per acre. Thus the results in this area in 1913 show typical use in a year of great demand for water and of limited supply, together with a high average price for alfalfa, while in 1914 they show typical use in a season of ample water supply and minimum incentive to alfalfa production.

With equivalent total applications of water in the Woodland area, the yields generally were greater on the heavier soils than on the lighter soils, undoubtedly due to some extent to the greater moisture retentive capacity of the heavier soils. While the average yield of hay per acre from the irrigated fields under observation in 1914 was 6.75 tons, the average yield from three unirrigated fields in the same year was only 3.66 tons. In 1913 the duty of water was generally higher on the finer textured soils, and this held true for single irrigations in 1914, also.

Soil moisture determinations were made in the Woodland area in 1913 before and after one irrigation on the Lawson field and before and after three irrigations on the Jackson-Woodard field. In 1914 determinations were made at each cutting and before and after each irrigation on the Hughson, Beck, Griffes, Guile, and Jackson-Woodard fields. The average proportion of each application of water accounted for in the first six feet of soil was 36 per cent for the lighter soils, 44 per cent for the medium soils, and 56 per cent for the heavy soils, indicating in each case that the amounts of water applied were greater than could be held where probably most needed. On the other hand, the results indicated that in many cases, in spite of the excessive applications between cuttings, the moisture content present was inadequate at times, due to the too great interval between irrigations.

Hughson Field. (Fig. 15.) The soil of this field is classed as Yolo silt loam. Moisture determinations in 1914 were made from 12 borings before and after the first irrigation, from six borings after the second irrigation, and from six borings at the first, second and fifth cuttings. Taking the field as a whole, the percentage of moisture in the soil at the beginning of the season was well above the amount necessary to maintain growth, but fell below the wilting point in a portion of the upper six feet of soil by the time of the second cutting, and in the entire upper six feet by the time the third crop was two-thirds grown, when the first irrigation was given. This first irrigation brought the moisture content back to the desired point but it went down again below the wilting point by the time of the fourth cutting, after which the second irrigation was given. At the first irrigation a depth of 26.2 inches of water was applied. The greatest increase in moisture content due to this irrigation was between the sixth and the ninth foot in depth, as determined six days following the application, with the limit of penetration somewhere below 12 feet. Of the 26.2 inches applied at this first irrigation, only 10.23 acre-inches per acre, or 39 per cent, was accounted for in the upper 12 feet, with only 20 per cent of the total application accounted for in the upper six feet. In a general way the same results were indicated from the moisture determinations following the second irrigation. The fact that only about one-fifth of the water applied can be accounted for in the upper six feet of soil, and no more than two-fifths in the upper 12 feet of soil, is evidence that through too deep penetration at the upper ends of the checks, much water is wasted in attempting to irrigate the lower ends of the long checks—1,270 feet in this field.

Lawson Field. The soil in this field is classed as a silt loam. Moisture determinations were made from eight borings before and after the third irrigation in 1913, at which irrigation a depth of 7.32 inches was applied. Of this, 2.56 acre-inches per acre, or 35 per cent, was found in the upper six feet, with two-fifths in the surface foot. An appreciable portion of the water applied undoubtedly penetrated below six feet in depth, but under the present conditions it is reasonable to assume that the greatest loss was due to evaporation during the extremely hot weather prevailing at the time. In general, the determinations indicate a lack of uniformity in water distribution.

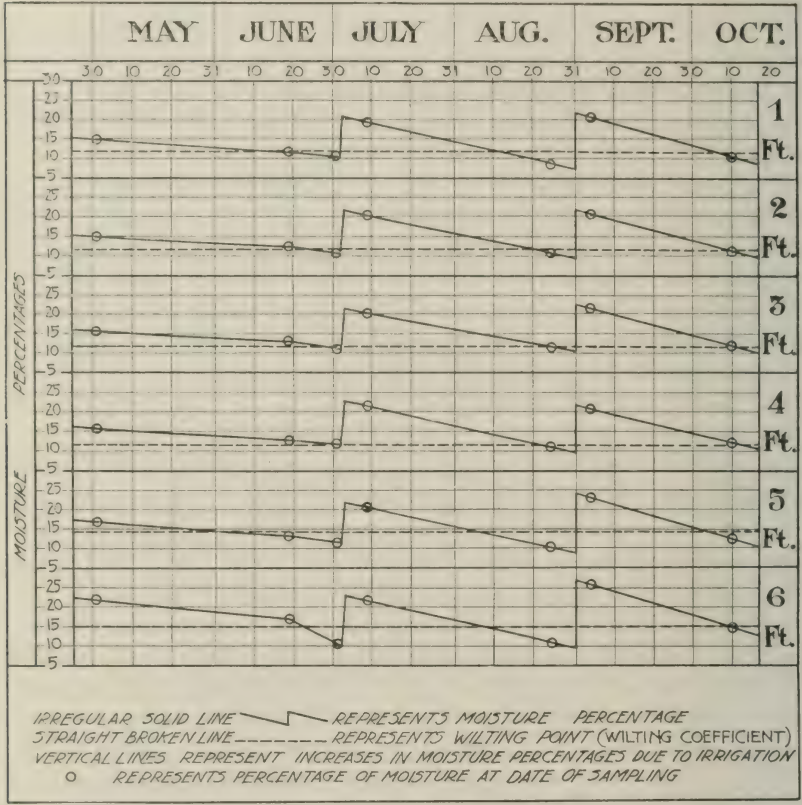

Fig. 15.—Diagram showing seasonal variation in soil moisture percentage, Hughson alfalfa field, Woodland, 1914.

Beck Field. The soil of this field is classed as Yolo loam. Soil moisture determinations were made from nine borings at each cutting and before and after each irrigation in 1914. Results, as platted in figure 16, indicate a very uniform decrease in moisture content of the soil from the beginning of the growing season until the first irrigation after the third cutting. The moisture present was above the wilting point throughout the upper six feet at the time of the first cutting, but was reduced to or below the wilting point by the second cutting, and went below the wilting point in the upper four feet by the third cutting, although with appreciably no change at the fifth and sixth foot in depth. At the first irrigation a depth of 11.56 inches of water was applied, of which 5.04 acre-inches per acre, or 43 per cent, was retained in the upper six feet, one-fourth of this remaining in the surface foot. At the second irrigation a depth of 7.48 inches was applied, of which 3.34 acre-inches per acre, or 45 per cent, was retained in the upper six feet, with one-third of this remaining in the surface foot.

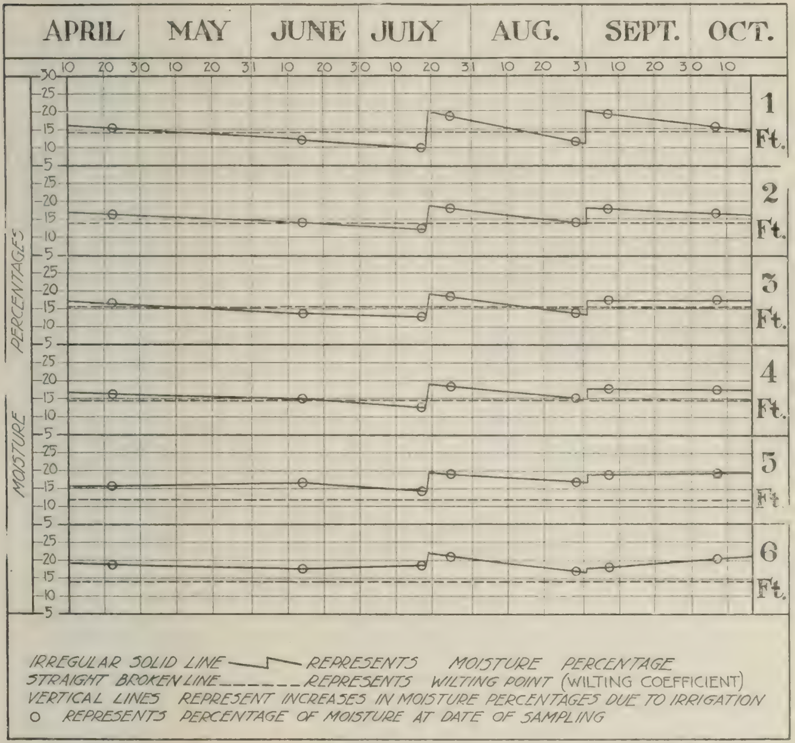

Fig. 16.—Diagram showing seasonal variation in soil moisture percentage, Beck alfalfa field, Woodland, 1914.

Griffes North Field. The soil in this field is classed as a silt loam. The field was irrigated twice in 1914 with approximately equal applications averaging 11.76 inches in depth. Moisture determinations were made from 18 holes before and after each irrigation and at each cutting except the fifth, when 12 holes were bored. At the first irrigation the upper six feet retained an average of 56 per cent of the amount applied, with relatively slight differences in the amount retained in each foot.

At the second irrigation 47 per cent of the quantity applied was retained, with the heaviest increase in the surface foot section. After the second irrigation the moisture decreased with the depth and indicated that less water went below six feet at the second irrigation than at the first. On the two plats into which the Griffes north field was divided, the north plat invariably showed a higher moisture content and produced a larger tonnage of hay. Taking the Griffes north field as a whole the results in 1914, as platted in figure 17, indicate an abrupt decrease of the moisture content of the soil between cuttings and an abrupt increase caused by irrigation, the differences being more marked than in the case of any other fields in the Woodland area. This is accounted for by the coarse texture of the soil. While the upper strata of soil, in which the moisture was found to be below the wilting point just prior to irrigations, were amply replenished by watering, the determinations indicate that the lower stratum received more than necessary, showing that lighter irrigations would have proven more economical.

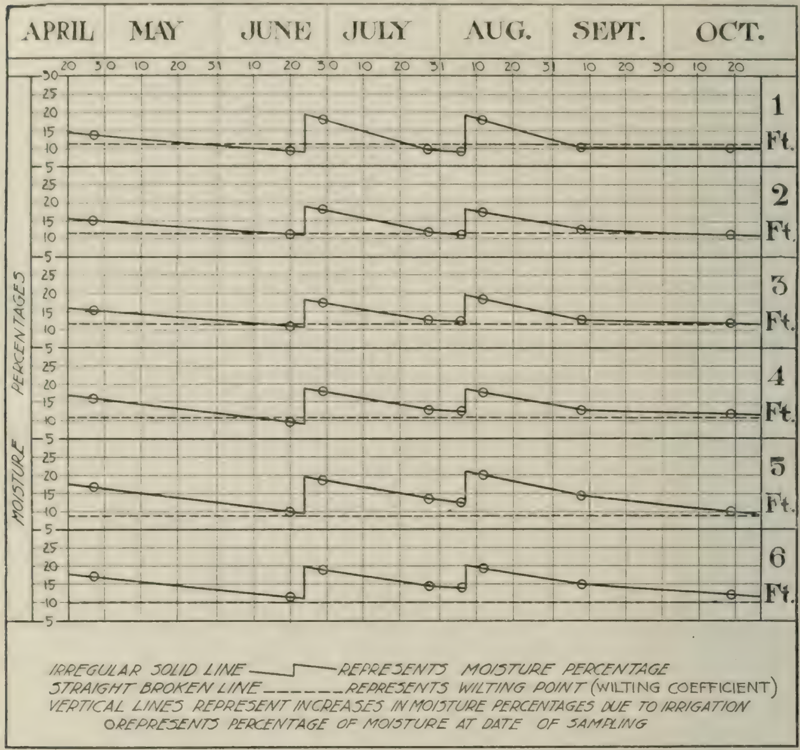

Fig. 17.—Diagram showing seasonal variation in soil moisture percentage, Griffes north field, Woodland, 1914.

Guile Field. (Fig. 18.) The soil of this field is classed as Yolo clay loam. Moisture determinations were made from six borings before and after the two irrigations given in 1914, from three borings at the first cutting and six borings each at the fourth cutting and at the end of the season. At the first irrigation a depth of 7.28 inches was applied, of which 4.03 inches, or approximately 55 per cent, remained in the upper six feet, nearly one-half of this remaining in the surface foot. At the second irrigation a depth of 5.94 inches was given, of which nearly 91 per cent was accounted for in the upper six feet, about one-third remaining in the surface foot. The relatively small quantities of water found below the surface foot or two confirmed field observations of the resistance offered by the soil of this field to the penetration of irrigation water. At the time of the first cutting the moisture content of the soil was so low, as shown by the diagram, that nowhere in the upper six feet was it much, if any, above the wilting point. And the same condition was approximated at the time of each subsequent cutting. Owing to the impermeability of this soil, heavy irrigations

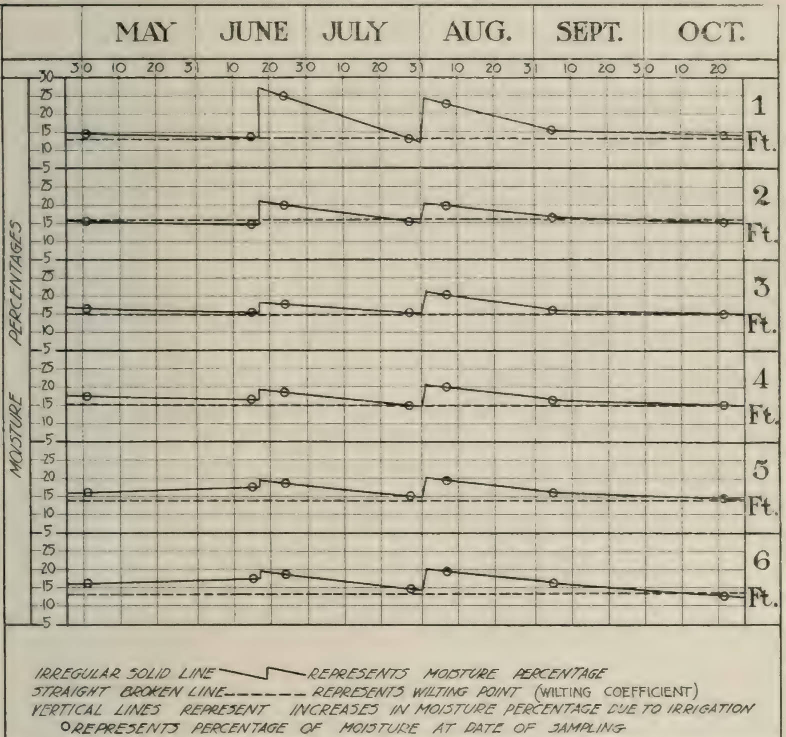

Fig. 18.—Diagram showing seasonal variation in soil moisture percentage, Guile alfalfa field, Woodland, 1914.

were shown not to be practical. Perhaps no field studied in the Woodland area was found to be so dependent upon timely irrigation as was this one.

Jackson-Woodard Field. (Fig. 19.) The soil of this field is classed as Yolo clay loam. In 1913 moisture determinations on the north plat were made from six borings before and after the third irrigation, from ten before and after the fourth, from four before and after the fifth, and on the south plat from ten borings before and after each of the third, fourth, and fifth irrigations. The applications of water at the three irrigations were nearly equal, averaging 5.6 inches in depth on the north plat and 5.4 inches in depth on the south plat. The average depth of penetration of irrigation water on the north plat was found to be about four feet after the third irrigation and only two feet after the fourth and fifth irrigations, whereas in the south plat percolation extended to or exceeded six feet in each case. On the north plat the increases by irrigation were always small; on the south plat, however, 39 per cent was retained in the upper six feet at the third irrigation,

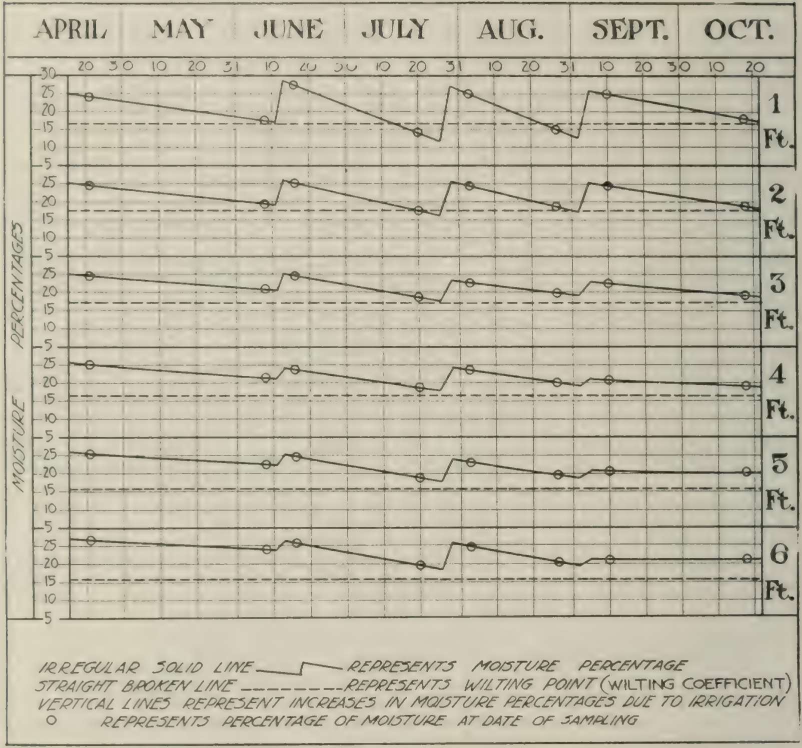

Fig. 19.—Diagram showing seasonal variation in soil moisture percentage, Jackson-Woodard alfalfa field, Woodland, 1914.

nearly 26 per cent at the fourth irrigation, and over 41 per cent at the fifth irrigation, the largest increases occurring in the surface two feet. In 1914 moisture determinations were made from six borings before and after each irrigation in each plat and at each cutting. The same differences in penetration of irrigation water found in 1913 were noted again. In addition to conserving a larger proportion of each irrigation, the south plat generally was found to contain a higher percentage of moisture than the north plat, especially in 1914, and the south plat in both years gave correspondingly larger yields of hay. As compared with the other fields in the Woodland area, there was a much higher percentage of moisture in the Jackson-Woodard field at the time of the first and second cuttings in 1914, with the average also remaining higher throughout the season. Prior to each irrigation, and more noticeably as the season advanced, the upper 12 to 18 inches of soil was found to be deficient in moisture, while the remainder of the six-foot section retained a uniformly fair moisture content. In both 1913 and 1914 the greatest increase in moisture resulting from irrigation took place at the lower ends of the checks, which varied in length from 340 feet to 575 feet. In 1914, for instance, when borings were made in three places in each check studied, the mean increase, expressed in acre-inches per acre, due to irrigation for the three irrigations was, respectively, 1.51 at the upper end, 2.44 at the middle, and 3.67 at the lower end in the north plat, and 3.44 at the upper end, 3.92 at the middle, and 4.74 at the lower end in the south plat. In other words, the soil did not absorb the water as rapidly as it was applied, and the result was an excess at the lower ends, where it penetrated in due time into the soil.

TABLE No. 13.

Summary of Results of Alfalfa Duty of Water Investigations, Woodland Area, 1913.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
Geo. W. Hughson	Silt loam	19.54	3	4.40	5	9.12
H. J. N. Rasmussen	Silt loam	15.94	3	4.22	4	5.52
Sylvester Lawson	Silt loam	25.63	4	2.38	5	5.91
Wm. Exley	Silty clay loam	23.20	4	2.81	4	4.77
R. E. Fisher	Silty clay loam	37.71	3	1.30	5	3.46
Frank Hermle	Silt loam	23.88	3	3.12	5	6.69
Geo. O. Griffes (south field)	Fine sandy loam	16.65	4	3.07	5	7.49
Geo. O. Griffes (north field)	Silt loam	48.80	3	3.26	3	[1]2.55
D. B. Guile	Silty clay loam	28.21	4	2.14	4	4.42
Jackson & Woodard (north plat)	Clay loam	10.26	6	3.39	5	7.68
Jackson & Woodard (south plat)	Clay loam	9.49	6	3.08	5	8.51
Mrs. Nettie Hadsall	Silty clay loam	35.76	2	2.11	4	4.17
Averages				2.94		5.86
Averages, excluding young alfalfa				2.91		6.16

[1] Young alfalfa.

NOTE.—Rainfall November 1, 1912, to October 31, 1913, 0.61 foot

TABLE No. 14.

Summary of Results of Alfalfa Duty of Water Investigations, Woodland Area, 1914.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied, feet	Number of cuttings	Total yield, tons per acre
Wm. Gould	Silty clay loam	19.95	0	0.00	5	4.05
Geo. W. Hughson	Silt loam	19.54	2	2.91	5	6.96
H. J. N. Rasmussen	Silt loam	10.23	0	0.00	3	3.61
John Beck[1]	Yolo loam	23.20	2	1.59	5	7.28
R. E. Fisher (east plat)	Silty clay loam	16.21	0	0.00	3	3.33
R. E. Fisher (west plat)	Silty clay loam	21.50	3	2.03	5	4.92
Geo. O. Griffes (south field, east plat)	Fine sandy loam	5.48	1	1.41	5	6.12
Geo. O. Griffes (south field, west plat)	Fine sandy loam	11.17	1	1.00	5	5.56
Geo. O. Griffes (north field, north plat)	Silt loam	24.40	2	1.96	5	7.81
Geo. O. Griffes (north field, south plat)	Silt loam	24.40	2	1.96	5	7.40
D. B. Guile	Clay loam	28.21	2	1.14	4	4.28
Jackson & Woodard (north plat)	Clay loam	10.26	3	2.14	5	8.07
Jackson & Woodard (south plat)	Clay loam	9.49	3	1.88	5	9.11
Averages for irrigated fields				1.80		6.75

[1] The Exley tract in 1913.

NOTE.—Rainfall November 1, 1913, to October 31, 1914, 2.45 feet.

DESCRIPTIONS OF FIELDS IN THE WOODLAND AREA AND COMMENTS ON IRRIGATION CONDITIONS AND PRACTICES.

Wm. Gould Field. Seeded in 1910. Stand of alfalfa rather thin, with bare spots of considerable area. Checks 866 feet by 50 feet. Preparation of land good. Observations made on this tract only in 1914; it was not irrigated in 1914, owing to the low market price of alfalfa hay, but data were secured on yields in order to afford comparison with irrigated fields.

Geo. W. Hughson Field. Seeded in 1903. Stand of alfalfa good. Yields heavily but is being thinned out by gophers and by difficulty of getting water to lower ends of some checks. Checks 1,270 feet by 82 feet, with grade averaging 4.3 inches in 100 feet. Preparation of land fair, but checks much too long for porous silt-loam soil, for they require excessive applications of water at upper ends in order to wet lower ends, resulting in great waste of water. Small check-gates also contribute to this end. First three crops irrigated in 1913 and third and fifth in 1914, heads used varying from 12 to 22 cubic feet per second, divided among three to five checks. Second irrigation in 1914 covered only part of field. Difference in crop yields between 1913 and 1914 is attributable to lateness of first irrigation in 1914 and insufficiency of moisture later on.

H. J. N. Rasmussen Field. Seeded in 1910. Stand of alfalfa fair. Checks vary in length from 165 to 720 feet and in width from 40 to 90 feet. Grade averages 3.4 inches in 100 feet. Field divided into three sets of checks and general preparation good. Irrigating heads used in 1913, when the first three crops were irrigated, ranged from 14 to 22 cubic feet per second. In 1914, owing to low prices received for alfalfa hay, field not irrigated. Yield in 1913 reduced by grasshoppers.

Sylvester Lawson Field. Seeded in 1911. Stand very good over most of field, but there are several gravel streaks where poor. Checks vary in length from 740 to 1,080 feet and average 57 feet wide. Grade fairly uniform, averaging 4.6 inches in 100 feet. Land generally well prepared for irrigation. Observations made on this tract only in 1913, when heads used ranged from six to seventeen cubic feet per second, only third crop being unirrigated. Soil moisture determinations at third irrigation indicated very unequal distribution of moisture. Two of crops damaged by grasshoppers.

Wm. Exley–John Beck Field. Seeded in 1906. Stand of alfalfa fair. Checks range from 375 to 1,290 feet in length, but width fairly uniform, averaging 73 feet. Grades range from zero to eight inches in 100 feet, averaging 3.1 inches. Preparation for irrigation fair. First, second, fourth, and fifth crops irrigated in 1913, with heads of nine to 14 cubic feet per second, and last two crops irrigated in 1914 with heads of 15 to 20 cubic feet per second, turned into two or three checks at a time. The great difference between yields of hay from this field in the two years studied due to ravages of grasshoppers, inability to cut the last crop because of rain, and inability to secure water when most needed in 1913, none of which conditions obtained in 1914.

R. E. Fisher Field. Seeded in 1907. This tract treated as single unit in 1913, but was divided into two plats in 1914. Stand generally good, but thinning out. Checks in east plat 320 to 630 feet long, in the west plat 700 feet long, and all average 58 feet wide, average grade being 1.9 inches in 100 feet. Field well prepared for irrigation, but ditches, originally made to take water from canal system, are too large for small heads, averaging 2.74 cubic feet per second in 1913 and 3.15 in 1914, secured from the pumping plant which now supplies the tract; checks also are too wide. Last three crops irrigated each year, but in 1914 only west plat was irrigated. Lower yield of hay in 1913 was due to failure to irrigate until after second cutting and to damage by grasshoppers.

Frank Hermle Field. Seeded in 1910. Stand excellent. Checks 630 to 640 feet long, average 65 feet in width, with average grade of 1.4 inches in 100 feet. Land well prepared for irrigation. First three crops irrigated in 1913, which was the only season in which observations were made, heads ranging from 13 to 19 cubic feet per second.

Geo. O. Griffes South Field. Seeded in 1912. This field comprises two distinct parts and in 1914 these were treated as separate units. Stand excellent. In the east plat checks are 800 feet long and in the west plat average 575 feet, all being 57 feet wide, with grade averaging 2.1 and 3.5 inches per 100 feet in east and west plats, respectively. Field well prepared for irrigation. In 1913 all crops except the third were irrigated, with heads of 11 to 15 cubic feet per second, and at the single irrigation between the third and fourth cuttings in 1914 the head averaged 20 cubic feet per second. Often the entire head was turned into a single check. Lower yields in 1914 were obviously due to the fact that only the fourth crop was irrigated, whereas all of the last three crops needed water.

Geo. O. Griffes North Field. Seeded in 1913. This field was divided into two plats for observational work in 1914. Stand of alfalfa one of the best in the area and field one of the most carefully prepared. Checks are all 810 feet long and 54 feet wide, with average grade of 1.4 inches in 100 feet in north plat and of 1.8 inches in south plat. All three crops were irrigated in 1913 with heads of 11 to 15 cubic feet per second, and in 1914 the third and fourth crops were irrigated with heads of 15 to 21 cubic feet per second, usually divided between two checks. The yields in the two seasons can not be compared owing to the fact that the alfalfa was in its first year in 1913.

D. B. Guile Field. Seeded in 1910. Stand of alfalfa fair. Checks average 1,275 feet in length, but vary in width from 45 to 120 feet, with average grade of 1.8 inches in 100 feet. Preparation for irrigation only fair. All four crops were irrigated in 1913 and last two in 1914, the heads of water averaging 12 cubic feet per second and usually were turned into single checks. It should be noted that, although only about one-half as much water was applied in 1914 as in 1913, the yield of hay was about the same in both years. This was accounted for by heavier rainfall and more timely irrigations in 1914.

Jackson–Woodard Field. Seeded in 1912. This field was treated as two units in 1913 and 1914. Stand of alfalfa excellent. In the north plat checks were 400 to 575 feet long, with grade averaging 2.2 inches in 100 feet, and in the south plat 340 to 520 feet, with average grade of 3.2 inches. All checks were about 40 feet wide. The checking system in this field was designed for a pumping plant and the general preparation was good. All crops were irrigated in 1913, including an irrigation after the fifth cutting, but in 1914 only the last three crops were irrigated. The pumping plant gave an average irrigating head of 3.78 cubic feet per second in 1913 and of 4.37 in 1914, in both cases being turned into one check at a time.

Mrs. Nettie Hadsall Field. Seeded in 1909. Stand only fair. Checks 970 to 1,105 feet long and from 45 to 60 feet wide, with average grade of 2.9 inches in 100 feet. Field generally well prepared for irrigation. Observations made only in 1913, in which year first and second crops were irrigated with heads of 13 to 16 cubic feet per second. This field is located under the Adams Canal and no water was available after early summer, whereas the tracts supplied by Moore Canal had a small amount for a much longer time, and this deficiency resulted in a low yield of hay.

Dixon Area.

Dixon is located in Solano County in the southwestern portion of Sacramento Valley. The nearest rainfall record is for Davis, eight miles northeast, where the mean is 17.23 inches.[1] At present no canal system serves the Dixon area, all irrigation water being secured by pumping from wells. In most cases the water is applied directly to the land without storage in farm reservoirs, although in the western part of the area several tracts are being irrigated from small pumping plants used in conjunction with storage. Some of the pumping plants are equipped with gas engines, but the majority have electric motors.[2] The soils of the area are mostly clay loams and clays of the Yolo and Capay series.[3]

Of the crops grown under irrigation, alfalfa occupies by far the largest acreage. In 1913 the average yield of six tracts of mature alfalfa was 6.76 tons per acre, distributed among five cuttings of 1.79, 1.61, 1.79, 1.35, and .22 tons per acre, respectively. The sudden drop in the average of the last cutting was due to the fact that the alfalfa on only two of these fields was cut five times, four crops being cut on three fields and three crops on the other.

The number of irrigations between cuttings varied in 1913 from one to four. Owing to the dryness of the season all first crops were irrigated, but in years of heavy rainfall one or even two crops may be grown without irrigation. The water-table was relatively low in 1913, and measurements of the discharges of 11 pumps showed all to be delivering below their rated capacities. Of two eight-inch pumps, the discharges were 29 and 36 per cent, respectively, below rated capacity; of three seven-inch pumps, the discharges were 12, 13, and 27 per cent below; of two six-inch pumps, 43 and 47 per cent below; and of four five-inch pumps, 54, 58, 66, and 71 per cent below, respectively. The expedient of lowering the pump several feet, which was tried by some owners, usually resulted in an increased flow.

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[1] Weather Bureau, Annual Summary for 1915.

[2] Underground water conditions are discussed in U. S. Geol. Survey Water Supply Paper 375-A, Ground Water for Irrigation in the Sacramento Valley, California.

[3] U. S. Dept. Agr., Bureau of Soils, Reconnoissance Soil Survey of the Sacramento Valley, California.

Both square or rectangular and border checks are in use at Dixon, the former usually being made as nearly square and as nearly level as possible. Of the two, border checks probably are the more widely used, but on the heavier soils the square or rectangular checks are considered to give better results because it is possible, with such checks, to keep water standing on the land longer than with border checks, thus facilitating penetration. Square or rectangular checks at Dixon usually are about 100 feet square and border checks vary in length from 75 to 1,750 feet and in width from 30 to 40 feet, with a grade of three to five inches in 100 feet. Check gates are small wood or concrete structures, but often water is admitted to checks through cuts in the ditch banks. Metal dams or tappoons often are used for diverting water into the checks.

Seven typical fields were included in the investigation at Dixon in 1913 (Fig. 20), weirs generally being used for measuring the applications. Underground movement of irrigation water applied was traced only on the Wright field, and owing to difficulty in penetrating the heavy soil with a soil auger moisture determinations are available for the upper six feet of soil from only ten borings before and after the fourth irrigation, from four before and after the fifth, and from nine before and after the sixth. The mean moisture content of the upper six feet of soil over the whole tract was safely above the wilting point throughout the period of these determinations, although in many single instances the percentage fell below the wilting point prior to irrigations. This good moisture condition is attributed to the frequent light irrigations given, and the effect is well

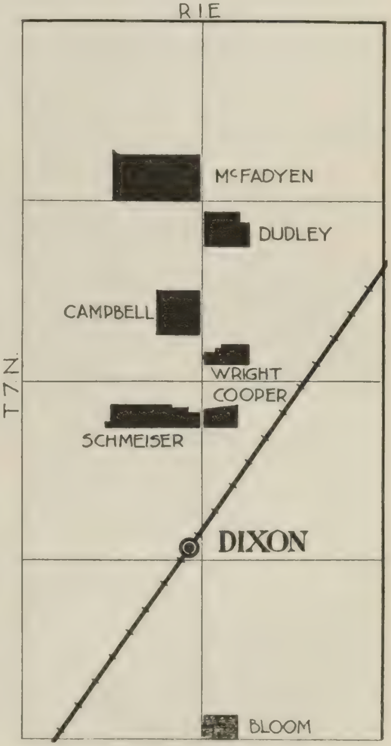

Fig. 20.—Map of Dixon area showing location of alfalfa fields under investigation, 1913.

shown in the high yields of hay secured—9.97 tons per acre. The highest percentage of moisture was found before and after the fifth irrigation.

The distribution of the irrigation water applied throughout the upper six feet of soil at the fourth irrigation, when the moisture determinations were commenced, was very uniform, 49 per cent of the 5.06 inches in depth applied being accounted for. At the fifth irrigation, when a depth of 6.06 inches was given, only 31 per cent remained in the upper six feet of soil, over one-third of this remaining in the surface foot. The moisture found in the soil after the sixth irrigation decreased perceptibly with the depth, indicating that little passed below six feet, and that the principal part of the moisture not accounted for was utilized by the crop, or evaporated from the surface.

In addition to the borings made to a full depth of six feet, four additional borings before and after the fourth irrigation, six before and after the fifth, and three before and after the sixth irrigation were stopped by failure of the irrigation water to soften the hard soil to the full six feet. This again illustrated the desirability of having irrigations on this field sufficiently frequent to keep the soil moist constantly throughout the rooting zone of the plants.

TABLE No. 15.

Summary of Results of Alfalfa Duty of Water Investigations, Dixon Area, 1913.

Name	Soil type	Area, acres	Number of irrigations	Total depth water applied feet	Number of cuttings	Total yield, tons per acre
J. R. Bloom	Clay loam	10.36	6	2.82	3	5.22
Mrs. Letitia Cooper	Clay loam	10.01	5	2.27	4	6.92
C. E. Schmeiser	Clay loam	36.20	8	3.06	4	5.61
D. W. Wright	Clay loam	12.10	8	3.15	4	9.97
M. D. Campbell	Clay loam	36.74	12	2.79	3	[1]1.72
E. D. Dudley	Silt loam	26.64	15	2.93	5	7.12
Harry McFadyen	Clay loam	74.12	15	3.43	5	5.72
Averages				2.92		6.04
Averages, excluding young alfalfa				2.94		6.76

[1] Young alfalfa.

NOTE.—Rainfall November 1, 1912, to October 31, 1913, 0.61 foot.

DESCRIPTIONS OF FIELDS IN DIXON AREA, AND COMMENTS ON IRRIGATION CONDITIONS AND PRACTICES.

J. R. Bloom Field. Seeded in 1890. Stand of alfalfa, which is one of the oldest in the area, still very good. Checks average 180 feet by 100 feet. Land generally is well prepared. First crop was irrigated once, second crop twice, and third crop three times, with head averaging 2.33 cubic feet per second. The relatively low yield of hay is attributable to lateness of beginning irrigation and to considerable damage done by alfalfa caterpillars (*Eurymus eurytheme*).

Mrs. Letitia Cooper Field. Seeded in 1904. Stand generally good. Checks roughly rectangular, from 55 to 195 feet long and averaging 52 feet wide. Checks mostly nearly level, but the longer ones have a grade of several inches in 100 feet.

General preparation for irrigation is good. Each crop was irrigated once with a head of 1.13 cubic feet per second, and a partial irrigation given after the fourth cutting. Water is purchased from a neighbor and the relatively low use probably is due to the fact that it was available only for a small part of the time.

C. E. Schmeiser Field. Seeded in 1907. Stand fair. Checks rectangular, about 110 feet long and 100 feet wide, and as a rule are mostly nearly level. Preparation for irrigation good. Each crop was irrigated twice with a head of 1.06 cubic feet per second.

D. W. Wright Field. Seeded in 1906. Stand very good. Checks rectangular, about 100 feet long and averaging 92 feet wide, and mostly nearly level. Land fairly well prepared for irrigation. First crop was irrigated once and each succeeding crop twice and extra irrigation was given after the fourth cutting. Average head of water .72 cubic foot per second.

M. D. Campbell Field. Seeded in 1912. Stand good. Field in border checks, 200 to 1,750 feet long and averaging 33 feet wide with average grade of three and one-half inches in 100 feet. General preparation for irrigation good. Each crop, including the pastured fourth crop, was irrigated three times with a head averaging 2.35 cubic feet per second.

E. D. Dudley Field. Seeded in 1912. Stand excellent. Border-check system followed, checks ranging from 85 to 570 feet long and averaging about 38 feet wide, with average grade of about six inches in 100 feet. Land, for the most part, is well prepared for irrigation. First crop was irrigated twice, second, third, and fourth crops three times each, and the last crop four times, with an average head of 1.94 cubic feet per second.

Harry McFadyen Field. Seeded in 1911. Stand of alfalfa good. Border checks, 60 to 940 feet long, average of 30 feet wide, with average grade of 3.6 inches in 100 feet. Land well prepared for irrigation. Each crop was irrigated three times with head averaging 2.44 cubic feet per second.

DISCUSSION OF RESULTS.

Comparison of Duty of Water and Yields of Alfalfa on 54 Sacramento Valley Farms with Results of Experiments at Davis.

As stated at the beginning of this bulletin, the purpose of the investigations herein reported was to obtain data that, taken in connection with the results of experiments in the duty of water for alfalfa at Davis, would give a basis for conclusions regarding the most satisfactory duty for this crop throughout Sacramento Valley. When a comparison is undertaken between the results of the investigations on the 54 Sacramento Valley farms studied in 1913 and 1914 and the results obtained at Davis from 1910 to 1915, it at once becomes clear that there is a wide variation, and that the results are not comparable unless full account is taken of the extreme differences in the conditions met. When the differences are analyzed, however, and the comparison is made between like or similar conditions, the results are not far apart. They are, in fact, sufficiently near agreement to establish the Davis results as applicable, in general, to the entire valley.

At Davis the amounts of water used were strictly under control, and, with the exception of the plat receiving a depth of 60 inches, single irrigations were, as a rule, not greater than the soil would retain, the soil moisture determinations before and after irrigation showing that an average of 76.4 per cent of the water applied to plats which were given a depth of six inches in one irrigation was retained in the upper six feet of soil and that the plats given seven and one-half, nine, and 12 inches irrigation, making an average of nine and one-half inches per application, retained an average of 60.6 per cent in the upper six feet of soil and 97.7 per cent in the upper 12 feet. The soil of the experimental irrigation tract at Davis is chiefly a fine silt loam, relatively uniform, with no impervious stratum, and with the ground water level below the normal feeding zone of the plant roots. The upper two feet is very uniform, but the third to eighth feet are of fine, sandy loam, pocketed at irregular intervals with coarse sand or clay loam. While at Gridley the surface soil of the fields under observation in 1913 does not vary greatly from the soil at Davis, most of it is underlain with hardpan, and all of it contained free ground water at six feet or less from the surface. At Los Molinos, while the soil of some of the fields is comparable with that at Davis, being of silty or sandy loam and of relatively uniform depth for at least 12 feet from the surface, some fields have more clay and some are more gravelly than those at Davis. The normal rainfall at Red Bluff, which is the nearest point of observation to Los Molinos, is approximately nine inches greater than at Davis, and in the years 1913 and 1914 it was more than six inches above the average at Davis for the six years covered by the experiments there. An entirely different type of soil is found at Orland, all but one of the fields investigated having been made up largely of gravel. Here, also, water conditions differ considerably from those at Davis, a shortage of water in the late season in 1913 having made it necessary to eliminate one irrigation.

A very wide departure in soil type is encountered at Willows and, as indicated by the summaries of use on fields under investigation there, it was impossible to get enough water into the soil to satisfy the needs of the crop. While the soils at Woodland are generally comparable with those at Davis, paying for irrigation water on a quantity basis rather than on an acreage basis, as at Gridley, Los Molinos, Orland, and Willows, altered the Woodland practice materially. During the season of 1913 at Woodland, following a winter of low rainfall, the usual practice was to give at least three irrigations, and some farms received water six times, alfalfa bringing good prices that year and water therefore being applied plentifully. In 1914, however, following a winter of more than normal rainfall, and when the price of alfalfa had dropped to nearly one-third the figure obtainable in 1913, no irrigators watered more than three times and as a rule only two, with many not watering at all. Observations were made at Dixon during 1913 only. Water used there is obtained from pumping plants and use generally represents what the various irrigators consider to be necessary. While in this regard conditions at Dixon are similar to those which governed during the experiments at Davis, at Dixon the soil is considerably heavier than at Davis, and takes water much less freely.

Gridley. Analyzing the results obtained at Gridley, it was found that a maximum yield of 9.38 tons was obtained from a field which received a total annual depth of irrigation water of 31.6 inches, but that the next nearest yield was only 7.28 tons per acre obtained on a field which received 34 inches of water for the season. Eight out of the fourteen fields studied at Gridley received greater annual depths of irrigation water than 34 inches, but on three of these the yield fell below five tons, on four below six tons per acre, and on seven below seven tons. In other words, after eliminating the single field that had the excessive yield of 9.38 tons per acre, it was found that the point beyond which it did not pay to add to the depths applied corresponds substantially with the points established in the Davis experiments, namely, between 30 and 36 inches. The seasonal rainfall at Gridley preceding the heaviest of these yields was 13.9 inches.

Los Molinos. Analyzing the results obtained at Los Molinos for the seasons 1913 and 1914, it is found that a maximum yield of 8.31 tons per acre was obtained with a total annual application of 47.4 inches, following an average rainfall for the two seasons of approximately 24.4 inches. To what extent, if at all, excessive use here reduced yields by soil leaching can only be conjectured. Seven of the 11 fields under observation received more irrigation water than the field of maximum yield, the maximum application being 84 acre-inches per acre. Of these seven fields, however, one yielded less than four and one-half tons per acre, four below six tons per acre, and six below seven tons per acre. At Los Molinos it is to be noted that both the maximum and the majority of applications were considerably in excess of the applications at Davis, but as pointed out in the discussion of soil moisture determinations in this area, the soils of the Los Molinos fields are highly permeable and the use of water was wasteful. Studies of the underground distribution of the irrigation water applied showed that beyond a doubt large quantities passed below a depth of six feet, single applications amounting, in numerous cases, to between 20 and 30 inches.

Orland. Averages for eight fields at Orland, where the soil is prevailingly gravelly, gave a maximum of 6.77 tons per acre with a total annual application of 24.6 inches after an average seasonal rainfall of 19.2 inches. The maximum yield at Orland was obtained on the field that received the least water, the yield from two of the seven remaining fields falling below five tons, and that from five falling below six tons. Of the whole eight fields water was applied in excess of 80 inches on two fields, in excess of 55 inches on three fields, and in excess of 45 inches on five fields.

Willows. With complete results available for only one year and from only three fields at Willows, but with these results verified by special studies in 1915, it is evident that the results are in no way comparable with the results at Davis, this being due to the "tightness" of the soil of the Willows fields and the impossibility of getting irrigation water into it in amounts sufficient to satisfy the plants. A maximum yield of only 5.39 tons was obtained at Willows with an application of 23.6 inches in addition to the seasonal rainfall of approximately 28.7 inches for the preceding winter. Results at Willows indicate plainly that the soil-moisture needs of alfalfa, on the soils that hold moisture so tenaciously as do those at Willows, are in excess of the maximum applications found in 1914. Further, it is plain from the special studies in 1915 that to irrigate adequately the silty clay loams and the clay adobes of the Willows area, water must be applied frequently and in small quantities, and at no time following the winter rainfall must the soil be allowed to dry out. The amount of water used on these Tehama clay soils is sure to increase as improvement in their physical condition, due to cropping and cultivation, makes them more pervious to water.

Woodland. Averages for the 12 fields at Woodland, for which full records are available, show a maximum yield of 8.81 tons per acre with a use of water of 29.7 inches in addition to an average seasonal rainfall of 18.3 inches. Three fields, which received depths of 23.5, 33.1, and 43.7 inches, gave respective yields of 7.60, 7.87, and 8.04 tons per acre. Taking seven fields for which the yields were most nearly equal, the range of variation being slightly over two tons and the average yield being 6.93 tons per acre, the average use was found to be a depth of 30.7 inches. Thus, at Woodland it is found also that the usual maximum use, taking an average of one wet and one dry season, does not depart widely from that found most satisfactory at Davis; also that the maximum average yield for one field during the two years of record was obtained with slightly less than 30 inches.

Dixon. Here the largest yield in the single year of observation was 9.97 tons per acre with a total depth of irrigation of 37.7 inches, in addition to a seasonal rainfall of 7.31 inches. The average use for six fields, from which complete records are available, was 35.3 inches, or again in close agreement with the Davis experiments.

The allowance necessary to be made for difference in local soil conditions and irrigation practice is, it is believed, fully established by the comparisons made above. In general, as already indicated, the statement is justified that the six-year record for Davis is applicable throughout the valley with the exception of on the very open soils such as those around Orland, and also with the exception of the silty clays and clay adobes found in these investigations in the neighborhood of Willows, but also existing elsewhere in considerable areas. The average for Willows indicates, as already pointed out, that total irrigations of less than 24 inches per season are insufficient for satisfactory yields, while the results at Orland indicate that applications averaging in excess of 48 inches per year, while sometimes difficult to overcome on the very gravelly soils, do not give corresponding increases in tonnage. The average use at Woodland, which was below that at either Dixon or Gridley, was plainly a result of the payment for irrigation water on a quantity rather than on a flat acreage basis. Finally, the average at Gridley illustrates what may be expected on the open loam soils underlaid with hardpan or ground water.

TABLE No. 16.

Summary of Results of Alfalfa Duty of Water Measurements on 54 Farms in Sacramento Valley, 1913 and 1914.

Name of area	Average rainfall, inches	Number of fields included	Areas covered by observations	Years	Average total depths of water applied, feet	Average total yields, tons per acre
Gridley	[1]22.24	14	284.22	1913	3.31	6.19
Los Molinos	[2]26.11	12	130.40	1913-14	5.15	6.01
Orland	19.23	7	214.52	1913-14	4.66	6.26
Willows	16.55	3	27.71	1914	1.83	4.82
Woodland	[3]17.23	12	295.07	1913-14	2.33	6.45
Dixon	[3]17.23	6	207.17	1913	2.94	6.76
Totals and averages	19.76	54	1,159.09		3.37	6.08

[1] Biggs record.
[2] Red Bluff record.
[3] Davis record.

Quantities of Water to Apply to Sacramento Valley Alfalfa Fields at Single Irrigations as Determined by the Capacity of the Different Soils to Retain Water.

Investigations of the gross and net duty of water made in the western states during the past two decades have demonstrated fully the need for carrying duty of water studies further than measuring the quantities of water applied. Therefore, in recent years, investigators have turned their attention to more or less precise methods of determining water requirements of crops under the various western soil and climatic conditions. The experiments on the duty of water for alfalfa conducted at Davis from 1910 to 1915 were intended to be as nearly as possible an application of these more or less precise methods to typical field conditions. When conducting the more general studies on typical farms throughout the Sacramento Valley, however, it was not possible, as already pointed out, to duplicate fully the methods followed at Davis.

Nevertheless, by making careful observations of the underground distribution of the irrigation water applied, a knowledge of what became of the irrigation water was substituted for a method of control that limited the applications to particular definite quantities.

At the outset of the investigations, one of the important practical questions presented was, how much irrigation water applied at one time, and added to that already present in the soil at the time of irrigation, would the various soils of Sacramento Valley retain? While no particular effort was made in the investigations to ascertain how much irrigation water the various soils encountered would hold during the actual process of irrigation[1], it was desired to ascertain how much would be retained after any surplus should pass on through the soil; or, in other words, how much of the water applied would be retained against gravity. As the amount retained would depend very largely upon the size of the soil particles, it was deemed best to have physical analyses made of the soil from a number of the fields under observation This was done by the division of Soil Technology of the college of agriculture of the University of California. Further: As the quantity of water soils will absorb and the rapidity with which it is absorbed depend quite largely on the compactness of the soil; and, also, in order to be able to determine what portion of the water applied in irrigation was retained by the soil, it was necessary to ascertain the volume weight of the soils "in place." This was done partly by standard laboratory methods, but chiefly by a special field method devised in the course of the investigations, and found to conform within satisfactory limits to other methods commonly used by investigators in more precise experiments.[2]

Reference to the amount of irrigation water that was retained by the soils of the various fields for which soil moisture determinations are available has been made in connection with the results obtained in the various areas. As shown there, the principal work in tracing the underground movement of the irrigation water applied was done on 15 fields—the Huartson and Williams fields at Gridley; the Wigno, Bundy, Hofhenke, and Geer fields at Los Molinos; the O'Hair field at Orland; the Purdy and Tuttle fields at Willows; the Griffes, Beck, Hughson, Guile, and Jackson-Woodard fields at Woodland; and the Wright field at Dixon. Results obtained in 1915 on the special experimental tract northeast of Willows are comparable with results on the 15 fields. The following summary arranges these fields in accordance with a general soil classification and presents the essential data with reference to the amount of water retained in the upper six feet of soil on each field. With the possible exception of the Guile field at Woodland and the fields at Willows, the soil sampling indicated that the full capacity of the soil to retain water, assuming sufficient drainage to carry off the free water, was satisfied.

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[1] This was, however, indirectly ascertained through "pore space" determinations.

[2] The method followed consisted in weighing all of the soil taken from holes carefully bored with a two-inch posthole type soil auger and then ascertaining the volume of this soil as it was "in place" by the use of a thin rubber tube inserted in the hole and filled with a known quantity of water. This method was "checked" against the laboratory method by use of the Bowman soil compactor, the iron cylinder, and the paraffin methods as applied to soils in place, in a series of experiments conducted by Mr. O. W. Israelsen of this investigation and Professor Charles F. Shaw of the division of Soil Technology of the department of agriculture of the University of California.

TABLE No. 17.

Summary of Number of Irrigations per Season, Average Depths of Water Applied at Each Irrigation, and Amounts of Water Retained in Upper Six Feet of Soil for Fifteen Typical Alfalfa Farms in Sacramento Valley, 1913-1914, and by Upper Five Feet of Soil on Willows Experimental Plat, 1915.

Class of soil and name of field	Location	Irrigations per season	Average depths of water applied per irrigation, inches	Water retained by upper 6 feet of soil	
				Acre-inches per acre	Per cent of amount applied
Silt loam soils with fine sandy loam subsoils—					
Wigno	Los Molinos	4	18.25	4.89	26.8
Griffes	Woodland	2	11.78	6.14	52.1
Averages			15.02	5.52	[1]36.8
Silt loam soils—					
Bundy	Los Molinos	4	12.30	4.03	32.5
Beck	Woodland	2	9.52	4.19	44.0
Hofhenke	Los Molinos	4	16.62	4.51	27.1
Averages			12.81	4.24	[1]33.1
Silt loam soils not included in preceding group—					
Hughson	Woodland	2	39.50	8.20	20.7
Huartson	Gridley	4	[2]7.20	4.19	58.1
Williams	Gridley	4	[2]5.88	[5]2.76	46.9
Clay loam soils—					
O'Hair	Orland	3	4.16	2.65	63.7
Geer	Los Molinos	4	19.67	4.50	22.9
Guile	Woodland	2	6.61	4.70	71.1
Jackson-Woodard	Woodland	3	8.04	3.33	41.4
Wright	Dixon	8	[3]5.44	2.31	42.4
Averages			8.78	3.50	[1]39.8
Clay soils—					
Purdy	Willows	4	5.06	1.48	29.2
Tuttle	Willows	4	[4]4.38	2.93	66.9
Averages			4.72	2.20	[1]46.8
Clay soils—					
Plats 3 and 4	Willows Experimental Tract	12	2.00	[6]0.54	27.0
Plats 6 and 7		8	3.00	[6]1.07	35.7
Plats 11 and 12		4	6.00	[6]1.57	26.2
Averages			3.67	1.06	[1]28.9

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[1] Averages determined by giving percentages weights proportionate to the amount of water applied.

[2] Sampled only for last three irrigations.

[3] Sampled only for three irrigations.

[4] Sampled only for last two irrigations.

[5] Moisture determinations made to depth of only four feet.

[6] Moisture determinations made to depth of only five feet.

Examination of the above summary brings out the following facts that should be of practical interest to the irrigator:

1. Four times as much water was applied, on the average, to the silt loam soils with fine sandy loam subsoils as it was possible to apply, on the average, to the compact clay soils of the experimental tract at Willows, and more than three times as much as was applied to the clay soils of the Purdy and Tuttle fields at Willows.

2. Only about one-third of the water applied to the silt loam soils, as represented by five fields, was retained for the use of the alfalfa plants in the upper six feet of soil, where the principal root development is located.

3. In the case of none of the 15 fields under observation did the amount of water retained per irrigation in the upper six feet of soil exceed 8.20[1] acre-inches per acre, and in only two cases of the 15 did it exceed six acre-inches.

4. In only two cases out of ten in connection with the clay soils did the water that was absorbed by the upper six feet of soil reach four acre-inches per acre, in only three cases did it exceed three acre-inches per acre, and in four cases it was less than two acre-inches per acre.

5. The average quantities of water retained per acre-foot of soil per irrigation were 0.92 acre-inch for the silt loams with fine sandy subsoils, 0.71 acre-inch for the silt loams without fine sandy loam subsoils, 0.58 acre-inch for the clay loams, and 0.37 acre-inch for the clays, not including the experimental tract at Willows—in every case less than one acre-inch per acre-foot of soil.

6. The maximum average quantities of water retained by the upper six feet of soil per acre-foot per irrigation were 1.02 acre-inches for the silt loams with fine sandy loam subsoils, 0.75[2] acre-inch for the silt loams without fine sandy loam subsoils, 0.78 acre-inch for the clay loams, and 0.49 acre-inch for the clays.

7. Counting only the fields in which the full capacity of the soils to retain water against gravity was satisfied, *i. e.*, all of the fields having loam soils except the Guile field at Woodland, the average water retained per irrigation in the upper six feet of soil was 4.31 acre-inches per acre, or only 32.6 per cent of the average individual applications, and only 0.72 acre-inch per acre-foot of soil.

8. Assuming that in every case the surface foot of soil received at each irrigation sufficient water to satisfy its full capacity to retain water against gravity, it is found from the detailed data at hand that the average for the 18 fields, including the experimental tract at Willows, was 1.23 acre-inches per acre, and that the averages for the different soil types were 1.08 acre-inches per acre for the silt loams, 1.35 acre-inches per acre for the clay loams, and 1.35 acre-inches per acre for the clays. Therefore, in the case of the typical silt loam soils of Sacramento Valley, assuming one irrigation per cutting, single applications of irrigation water exceeding a depth of one to one and one-half inches per foot in depth of soil it is necessary to moisten accomplish no useful purpose; and while the typical clay loams and clays of Sacramento Valley, in their normal condition of moisture, will absorb and hold against gravity as much as one and one-fourth to one and three-fourths inches in depth of irrigation water per foot of soil it is necessary to moisten, that amount of water will not be absorbed by these soils unless it is applied very slowly.[3]

It seems perfectly evident from the figures given above that there is much ground for improvement in the matter of the quantity of water to apply to the alfalfa fields of Sacramento Valley at single irrigations. Had it been feasible to carry the soil moisture determinations to a greater depth than six feet, the extent of the waste resulting from the large single applications would be clearer. The data obtained are, however, sufficient to show clearly that the prevailing practice on Sacramento Valley alfalfa fields is to apply far more water at single irrigations than the more open soils have capacity to retain and than the more compact clay soils absorb under the methods of application followed.

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[1] Clay loam strata at depths varying from eight to ten feet caused partial water logging in overlying soil, hence the figure 8.20 is unusually high. All of the water in this soil was not retained against gravity.

[2] Not counting the field on which 8.20 acre-inches per acre were retained because of abnormal conditions previously referred to.

[3] It is of interest here to note that with the surface foot of soil filled to its capacity to retain water against gravity, the percentages of the pore space of the soil filled were as follows: For the silty loam soils, from 37 to 55 and averaging 45.5; for the clay loam soils, from 51 to 71 and averaging 62.2; for the clay soils, from 57 to 74 and averaging 65.5; and for all of the fields combined, 54.5.

A significant comparison can be made between the amounts of water retained by the soil in the case of the 15 typical Sacramento Valley alfalfa farms and the amounts retained in the case of six of the plats on the experimental tract at Davis, where the applications of water were under definite control. The average depth of water applied per irrigation to these six plats was 7.75 inches and the average quantity retained in the upper six feet of soil in the years 1913, 1914, and 1915 was 4.59 acre-inches per acre, or 66.8 per cent of the amount applied. On some of these plats, however, the borings for soil moisture determinations were made to a depth of 12 feet and it was found that within this depth practically all of the water applied was retained for the benefit of the plants. The average amount of water added by irrigation to the surface foot of soil in the Davis experiments was 1.45 acre-inches per acre. In other words, from the standpoint merely of the capacity of such deep loam soil as that at Davis to retain irrigation water against gravity, and assuming that the lower depths will "take up" as much water as the surface foot, the application once per cutting of one and one-half acre-inches of water per acre-foot of soil it is desired to moisten is not excessive.

Desirable Irrigation "Heads" for Sacramento Valley Alfalfa Fields.

In any investigation of the proper duty of water the size of the irrigation heads used and its relation to the type of soil irrigated, the method of irrigation followed, and the size and slope of the individual areas watered with a single head are always important. Fields may be evenly surfaced and levees perfectly made and proportioned and yet the result still will be excessive waste or inadequate absorption if the stream of water turned into each check is either too large or too small. The discussion as to what became of the water applied on a number of Sacramento Valley alfalfa fields, already presented, showed that where large quantities were applied to the open loam soils at single irrigations much of the water passed below the principal rooting zones of the alfalfa plants, and that the usual practice followed in irrigating the clay soils failed to accomplish sufficient penetration by the water. The stabilizing of the irrigation heads used in Sacramento Valley, with direct reference to the size of checks and the character of the soil, is obviously one of the very important irrigation problems of the valley. Quite extensive experiments and observations will be necessary for furnishing a satisfactory basis for fully understanding this problem, but the collection of some information bearing on the question was accomplished during the investigations in 1913 and 1914. This information was obtained from twenty-five fields—three at Gridley, two at Los Molinos, five at Orland, two at Willows, nine at Woodland, three at Davis and one at Dixon. Five classes of soil were covered—gravelly loams, three fields; sandy loams, four fields; silt loams, nine fields; clay loams, six fields; and clays, five fields. Observations of the underground distribution of the water applied were made in connection with ten of the fields. The following summary lists the fields according to the soil classification made, with the fields within each group arranged according to the rates of application used expressed in cubic feet per second per acre.

TABLE No. 18.

Summary of Rates of Application of Water to Sacramento Valley Alfalfa Fields at Separate Irrigations, 1913-1915.

Soil type and field	Location	Year	Average length of checks, feet	Average width of checks, feet	Average slope of checks, inches in 100 feet	Number of irrigations represented	Average area of checks, acres	Average head turned into each check, cu. ft. sec.	Average rate of application, cu. ft. per second per acre	Average depth of water applied, feet
Gravelly loams—										
Holland	Orland	1914	150	50	Level	13	0.17	5.2	31.0	0.58
Lawton	Orland	1914	100	100	Level	13	0.23	5.0	22.0	0.74
Spence	Orland	1914	100	100	Level	10	0.23	3.7	16.2	0.56
Average									23.0	
Sandy loams—										
Griffes, south (west plat)	Woodland	1914	575	57	3.5	1	0.75	19.4	25.9	1.00
Griffes, south (east plat)	Woodland	1914	800	57	2.5	1	1.04	20.2	19.4	1.41
Griffes, north	Woodland	1914	810	54	1.0	1	1.00	10.3	10.3	0.96
Griffes, north	Woodland	1914	810	54	1.0	1	1.00	8.2	8.2	1.00
Griffes, north	Woodland	1913	810	54	1.0	1	1.00	8.0	8.0	0.92
Griffes, north	Woodland	1913	810	54	1.0	1	1.00	6.0	6.0	1.11
Griffes, north	Woodland	1913	810	54	1.0	1	1.00	4.8	4.8	1.23
Summers	Gridley	1913	465	55	3.5	4	0.59	2.7	4.6	0.56
Average									10.9	
Silt loams—										
University Farm, west half Field 3	Davis	1915	880	50	3.5	1	1.01	16.0	15.9	0.76
University Farm, west half Field 3	Davis	1914	880	50	3.5	1	1.01	15.1	15.0	0.84
Hofhenke	Los Molinos	1914	450	40	5.0	4	0.41	5.0	12.2	0.94
University Farm, west half Field 3	Davis	1915	880	50	3.5	1	1.01	10.9	10.8	1.48
University Farm, east half Field 3	Davis	1914	880	50	3.5	1	1.01	10.6	10.5	1.32
University Farm, west half Field 3	Davis	1914	880	50	3.5	1	1.01	10.0	9.9	1.17
University Farm, east half Field 3	Davis	1914	880	50	3.5	1	1.01	9.8	9.7	1.06
University Farm, Field 1B	Davis	1915	600	50	3.15	3	0.69	6.7	9.7	0.51
University Farm, east half Field 3	Davis	1915	880	50	3.5	1	1.01	9.7	9.6	1.70
Hermle	Woodland	1914	638	65	1.0	3	0.95	8.5	8.9	1.04
University Farm, east half Field 3	Davis	1914	880	50	3.5	1	1.01	8.8	8.7	2.78
University Farm, west half Field 3	Davis	1914	880	50	3.5	1	1.01	8.5	8.4	3.08
Hughson	Woodland	1914	1,270	82	3.5	1	2.40	15.3	6.4	2.00
McFarland	Gridley	1913	623	60	7.0	4	0.86	5.3	6.2	0.86
Hughson	Woodland	1914	1,270	82	3.5	1	2.40	9.6	4.0	2.28
Fisher	Woodland	1914	700	58	2.5	4	0.93	3.1	3.3	0.62
Huartson	Gridley	1913	610	65	2.5	4	0.91	2.4	2.6	0.66
Average									8.8	
Clay loams—										
Bratton	Gridley	1913	92	50	Level	4	0.11	1.9	17.3	0.96
Jackson-Woodard, south plat	Woodland	1914	449	40	3.5	3	0.41	4.4	10.7	0.63
Jackson-Woodard, north plat	Woodland	1914	478	40	2.5	3	0.44	4.3	9.8	0.71
Jackson-Woodard, south plat	Woodland	1913	449	40	3.5	6	0.41	3.8	9.2	0.51
Jackson-Woodard, north plat	Woodland	1913	478	40	2.5	6	0.44	3.8	8.6	0.56
Guile	Woodland	1914	1,275	94	2.0	1	2.78	13.3	4.8	0.49
Guile	Woodland	1913	1,275	94	2.0	4	2.78	12.0	4.3	0.54
Guile	Woodland	1914	1,275	104	2.0	1	3.05	12.5	4.1	0.61
O'Hair	Orland	1914	1,250	40	2.5	3	1.15	3.4	3.0	0.35
Wright	Dixon	1913	99	92	Level	8	0.21	0.2	1.0	0.39
Average									7.3	
Clays—										
Brantley	Orland	1914	150	150	Level	18	0.52	2.7	5.2	0.22
Goos	Willows	1915	600	40	12.0	7	0.55	2.5	4.5	0.23
Goos	Willows	1914	600	40	12.0	10	0.55	1.9	3.5	0.18
Chambers	Los Molinos	1914	561	50	2.5	6	0.64	1.0	1.6	0.24
Cooper	Willows	1915	622	40	5.0	7	0.57	0.7	1.2	0.22
Average									3.2	

It is evident from the above summary that the most desirable head of water to use on any given soil can not be determined adequately by comparing use on different fields, especially when the applications have not been entirely under control, with a view to determining the best rates to follow. The present general practice in Sacramento Valley, expressed in cubic feet per second per acre, is, however, satisfactorily indicated from the average figures obtained, namely, 23 for gravelly loams, 10.9 for sandy loams, 8.8 for silt loams, 7.3 for clay loams, and 3.2 for clays. The difficulty of irrigating porous soils with small heads, and of irrigating clay soils with large heads is well recognized among irrigators, even if the most satisfactory relationships have not been worked out in detail.

While a comparison of the rates of application on different fields as given above fails to disclose the best size of heads to use, a comparison of the relation between irrigation heads and depth of application on single fields makes it plain that in many cases the heads should be increased, or even better, that the area of checks should be reduced. This is made clear by the following summary which gives the average heads used and the depths of water applied for those cases in which more than one observation for a single field provides a basis of comparison:

TABLE No. 19.

Summary of Rates of Application of Water and of Depths Applied at Different Irrigations of Five Individual Fields.

Soil type and name of field	Rate of application, cu. ft. per sec. per acre	Depths of water applied, feet
Sandy loams—		
Griffes, south plat	25.9	1.00
Griffes, south plat	19.4	1.41
Griffes, north plat	10.3	0.96
Griffes, north plat	8.2	1.00
Griffes, north plat	8.0	0.92
Griffes, north plat	6.0	1.11
Griffes, north plat	4.8	1.23
Silt loams—		
University Farm, west half Field 3	15.9	0.76
University Farm, west half Field 3	15.0	0.84
University Farm, west half Field 3	10.8	1.48
University Farm, west half Field 3	9.9	1.17
University Farm, west half Field 3	8.4	3.08
University Farm, east half Field 3	10.5	1.32
University Farm, east half Field 3	9.7	1.06
University Farm, east half Field 3	9.6	1.70
University Farm, east half Field 3	8.7	2.78
Hughson	6.4	2.00
Hughson	4.0	2.28
Clay loams—		
Jackson-Woodard, south plat	10.7	0.63
Jackson-Woodard, south plat	9.2	0.51
Jackson-Woodard, north plat	9.8	0.71
Jackson-Woodard, north plat	8.6	0.56
Guile	4.8	0.49
Guile	4.3	0.54
Guile	4.1	0.61
Clays—		
Goos	4.5	0.23
Goos	3.5	0.18

It is seen from the above summary that in each instance for sandy loam and for silt loam the depth of water applied increased with a decrease in the rate of application, although in individual cases, and by a small margin, there are exceptions. As already pointed out in connection with the quantities of water the different Sacramento Valley soils will retain against gravity, the depths applied in single irrigations in such instances as the Griffes and Hughson fields—from 0.96 foot to 1.41 feet on the former, and as high as 2.28 feet on the latter—are plainly excessive, and the figures given above make it evident that, when compared to the size of the checks, the irrigation heads used on such fields were too small. This deficiency in the rate of application is even more plainly marked in the case of University Farm field No. 3, on which the depth of water applied per irrigation ranged from 0.76 foot to 3.08 feet and averaged 1.58 feet.

If the above figures seem to lack somewhat in conclusiveness, data obtained in a single experiment at Davis in 1915 fully support the conclusion reached above. In this experiment measurements were made of the amount of water required to cover a one-acre check having a slope of three and one-half inches per 100 feet when applied at different rates. The data obtained were as follows:

Rate of application, cubic feet per second per acre	Depth of water required, feet
4.6	2.75
10.1	1.86
13.5	1.16
15.3	0.84
17.8	0.69

Until the proper relation between irrigating heads and size of checks is satisfactorily worked out in Sacramento Valley soil, there is sure to be, there as well as elsewhere, much difference of opinion as to whether small checks and correspondingly small irrigation heads or large checks and correspondingly large irrigation heads should prevail in the irrigation of alfalfa. Those who favor large checks and large heads base their preference chiefly on the greater rapidity with which irrigation can be accomplished with large heads, and also on the assumed lesser cost of preparing the land for irrigation. As a rule, where large heads are available they are used, and in some cases, as pointed out in connection with the heavy soils, especially the "water tight" soils found in some portions of the Willows area, the heads were plainly larger than they should be. In the case of individual pumping plants, which rarely discharge more than one or two cubic feet per second, checks necessarily are small. That waste of land goes with the large field ditches necessary in carrying large heads, and also that extravagant notions of use, and a greater waste when breaks occur with large heads, are sound arguments in favor of small heads, can not be doubted. Thoughtful consideration by irrigators and intelligent advice by public agencies in time will work out that relationship which best will serve both irrigators and the public. In the mean time, it is very clear that irrigators should bear in mind the fact that the irrigation head should not be a constant quantity, but should be varied where practicable, with the different soils found on nearly every farm.

Desirable Moisture Percentages for Alfalfa in Sacramento Valley Soils and the Effect of Variation in Soil Moisture on Rates of Alfalfa Growth.

In interpreting the large number of soil moisture determinations made at Davis and on Sacramento Valley alfalfa farms from 1913 to 1915, account has been taken of the moisture percentages found as related to the percentages at which the plants would wilt, and also of the effect of the variation in those percentages on the growth of the alfalfa. The percentages at which the plants wilt, or the ''wilting coefficients,'' have been computed on the basis of the experiments of Messrs. Briggs and Shantz of the Bureau of Plant Industry of this department.[1] As indicated by these experiments, the wilting percentage may be stated to be the point below which moisture in the soil ceases to be available to the plants, or, at least, below which it is obtained only with great difficulty. Due largely to the difference in the size of the soil particles, plants will wilt in clay soils when there is still an amount of moisture that in sandy soils would be ample for all plant requirements. In interpreting the figures that have been obtained, therefore, in so far as they relate to the rates of growth of the alfalfa, it must be kept in mind that the percentage of moisture above the wilting point, or, in other words, the available moisture, has the most significance.

The summary below presents the essential soil moisture data found, expressed as percentages of the dry weight of the soil and ranged in order of alfalfa yields, for eight plats on the irrigation tract on the University Farm at Davis, for 1915; for six plats on the experimental field at Willows, for 1915; and for 11 Sacramento Valley farms for either 1913 or 1914, together with the soil types, the depths of irrigation water applied, and the total yields. In this summary the total and available moisture percentages are given, and also the range between mean maximum and mean minimum percentages.

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[1] U. S. Dept. Agr., Bureau of Plant Industry Bulletin 230. The wilting percentages, or "wilting coefficients," for the Sacramento Valley soils are based on the "moisture equivalents" of those soils as determined in the laboratory of the division of Soil Technology of the department of agriculture of the University of California in the course of these investigations. It might be noted here that the moisture equivalents are the percentages of moisture retained in the soil after the soil has been subjected to a centrifugal force equal to 1,000 times the force of gravity.

TABLE No. 20.

Depths of Water Applied, Yields of Alfalfa, Percentages of Moisture Present, and Wilting Percentages for 8 Experimental Plats at Davis, 6 Experimental Plats at Willows, and 11 Sacramento Valley Alfalfa Farms, Arranged in Order of Yields.

Plats or field	Location	Soil	Depth of water applied, feet	Annual yields of alfalfa, tons per acre	Average per cent of total soil moisture present	Per cent of soil moisture necessary for particular soil to prevent wilting ("Wilting coefficient")	Average per cent of available moisture present	Range in per cent of available soil moisture
22, 25	Davis	Silt loam[1]	3.00	8.63	14.95	10.35	4.60	5.41
Jackson-Woodard	Woodland	Clay loam	2.01	8.59	21.46	16.45	5.01	4.14
Bundy	Los Molinos	Silt loam	4.10	8.39	20.35	15.12	5.23	4.58
21, 26	Davis	Silt loam[1]	2.50	8.32	16.91	10.35	6.56	6.11
23, 24	Davis	Silt loam	4.00	8.05	17.50	10.35	7.15	6.74
D	Davis	Silt loam[1]	2.00	7.96	16.50	10.35	6.15	5.83
Griffes	Woodland	Silt and fine sandy loam	1.96	7.69	14.59	10.67	3.92	5.49
Beck	Woodland	Silt loam	1.59	7.28	16.55	13.80	2.75	2.63
O'Hair	Orland	Clay loam	1.04	7.17	16.55	11.55	5.00	3.25
Hughson	Woodland	Silt loam	2.91	6.96	15.38	12.74	2.64	6.77
Wigno	Los Molinos	Silt and fine sandy loam	6.08	6.68	17.77	12.14	5.63	5.31
19, 28	Davis	Silt loam[1]	1.50	6.46	14.65	10.35	4.30	5.38
Geer	Los Molinos	Clay loam	6.56	6.06	19.93	14.44	5.49	3.84
Hofhenke	Los Molinos	Silt loam	5.55	5.75	17.83	10.80	7.03	4.34
31	Davis	Clay loam	5.00	5.55	27.38	16.59	10.79	7.74
3, 4	Willows	Clay	2.00	5.07	12.63	11.60	1.03	0.78
18, 29	Davis	Clay loam	1.00	4.84	20.39	16.59	3.80	5.67
6, 7	Willows	Clay	2.00	4.42	13.15	12.54	0.61	1.80
11, 12	Willows	Clay	2.00	4.29	11.84	12.38	—0.54	2.73
Guile	Woodland	Clay loam	1.14	4.28	16.99	14.41	2.58	3.40
Purdy	Willows	Clay	1.69	3.75	14.64	15.72	—1.08	1.61
17, 30	Davis	Clay loam	-------	2.35	17.36	16.59	0.77	

[1] With fine sandy subsoil.

Average wilting percentages as given above: Silt loams with fine sandy subsoils, 10.65; other silt loams, 13.12; clay loams, 14.21; clays, 13.06.

Average per cents of available moisture present: With yields over 8 tons per acre, 5.71; with yields from 6 to 8 tons per acre, 4.48; with yields under 6 tons per acre due to excess of water, 8.91; with yields under 6 tons per acre due to deficiency of water, 1.02.

Obviously, it is impossible to disregard the numerous soil and climatic factors other than soil moisture that affected the yields of alfalfa and then to expect the yields and moisture percentages to be consistent throughout.[1] However, by grouping the yields above eight tons per

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[1] The low yields on the Tehama clays at Willows suggested the desirability of a chemical analysis of the soil from the experimental plat there. Samples were accordingly taken at depths of 4 and 20 inches and submitted for analysis to Dr. C. B. Lipman, professor of soil chemistry and bacteriology, college of agriculture, University of California. The results of the analysis, together with the comments of Dr. Lipman, follow:

	Per cent at depth of 4 inches	Per cent at depth of 20 inches
Nitrogen	0.059	0.036
Phosphoric acid	0.11	0.12
Potash	0.53	0.62
Lime	0.63	0.74

"These analyses show that the great deficiency of the soil is in nitrogen, undoubtedly both available and total. There is an ample supply of potash, by all the standards which we use at the present time as criteria. There is a quantity of lime, which, for that type of soil, is low, though for ordinary soils would be quite ample. Therefore lime should be added to that soil in larger quantity for the sake of the physical condition, though chemically speaking, the above figures would appear to be adequate. The phosphoric acid content shows adequacy, provided the root systems of the plants can have at least three feet of soil to feed on. Otherwise phosphate fertilizers will have to be employed."

acre, from six tons to eight tons per acre, and below six tons per acre, it is possible to approximate the best or "optimum" percentage of available moisture over and above the amount necessary in each soil to prevent wilting. Assuming the yields over six tons per acre to have been produced on soil having at least as much as the "optimum" percentage of available moisture, the summary indicates that the "optimum" for Sacramento Valley conditions ranges between about three per cent and about seven per cent and averages about five per cent above the wilting percentage.

For the Hofhenke field at Los Molinos and plat 31 at Davis, on both of which an excess of irrigation water was applied, the average available percentage was 8.91, or well above the "optimum." On the other hand, the average percentage of available moisture on experimental plats 3, 4, 6, 7, 11, and 12 at Willows, plats 17 and 30 and 18 and 29 at Davis, the Guile field at Woodland, and the Purdy field at Willows, for which either the application or the absorption of irrigation water was plainly deficient, was only 1.02, or well below the "optimum."

The column in the summary giving the percentages of moisture that must be present in the various Sacramento Valley soils dealt with in order to prevent wilting, and also the averages for the various soil types as given at the foot of the summary, are believed to be of value because they indicate to Sacramento Valley irrigators not only the difference between the clay, or "heavy" soils and the loams and sandy soils as regards the amount of soil moisture needed to prevent wilting, but also that for all of the soils the wilting percentage is higher than farmers usually suppose. If one could assume an absolutely dry soil it might be convenient for irrigators to know that, as disclosed in the investigations reported herein, the amount of water necessary to supply the wilting percentage is approximately the equivalent of about one and two-thirds inches of rainfall per foot of depth of soil in which the crop is growing in the case of the silt loams with fine sandy loam subsoils, of about two inches in the case of the other silt loams, of about two and one-fourth inches in the case of the clay loam, and of two and three-fourths inches or more in the case of clays such as those found at Willows.[1]

In other words, with an absolutely dry silt loam soil eight feet deep the first 16 inches of irrigation water would no more than supply the amount of moisture necessary to keep deep-rooting plants from wilting; or expressed still differently, with such a soil wholly devoid of moisture, the equivalent of a rainfall of two inches for each one foot depth of soil the crop utilizes would need to be supplied before the roots of the crop could begin to utilize the moisture. Fortunately an absolutely dry soil is rarely found in Sacramento Valley, even at the end of the summer season, and except in very dry years the soils of Sacramento Valley are not likely to begin the spring growing season with less soil moisture than the wilting percentage. Those having clay or other heavy soils, however, should not fail to take note of the very low available moisture percentages, or the absence of any available moisture whatever, and the resulting very low yields of alfalfa, indicated in the bottom six lines of the summary. The figures given should make it very plain that soils into which irrigation water percolates with difficulty should be watched very carefully at depths from four to six feet below the surface. The experience of the field investigators at Willows indicated that this care is especially necessary even early in the summer in order to insure that an adequate irrigation supply shall replace the moisture absorbed from the winter rainfall after that has been utilized.[1]

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[1] The soil moisture studies in connection with the clay soils at Willows disclosed lower wilting percentages and lower capacities to absorb irrigation water than were to have been expected. It is not intended to discuss this technical phase of the subject in the present report, and conclusions for all Sacramento Valley clay soils can not and should not be drawn from the experience reported herein with the Tehama clays under investigation at Willows.

Seasonal Duty of Water on Sacramento Valley Alfalfa Farms.

For the purpose of showing what portion of the total irrigation water used annually by Sacramento Valley alfalfa growers is applied in each month of the irrigation season, the figures obtained for 1913 and 1914 have been averaged and the results given in Table No. 20. It is to be noted that the monthly use differs slightly in different sections. The greater rainfall at Los Molinos and Gridley results naturally in a later beginning of irrigation in the spring and an earlier ending in the fall. Besides, there was no water shortage at either Gridley or Los Molinos during the two years of the investigation. Irrigation at Orland ended earlier in 1913 than in 1914 because of shortage of water. At Woodland, as explained in the text, in 1913, which was a year of scant rainfall and high prices for alfalfa, in nearly each case irrigation began in March, whereas in 1914, a year of ample supply but of low returns on hay, it did not begin on any farm before June, in some cases not before July, and in two cases not before August, when a single irrigation for the season was applied. It might be added that the figures for both Gridley and Dixon covered the year 1913 only.[2]

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[1] What is said in the text regarding desirable moisture percentages for Sacramento Valley soils growing alfalfa considers the matter only from the standpoint of the total annual yields of hay. It is obvious, however, that the annual yields are results of conditions that vary from day to day and from week to week. For instance, considering the moisture factor only, annual differences in yield were results of the daily and weekly differences due to daily and weekly variations in soil moisture. The data collected have been studied with reference to the effect of these changing moisture percentages on the seasonal rates of growth, but as no data were collected to indicate daily or even weekly variations in rates of growth, making it necessary to rely on average rates of growth between cuttings, such deductions as were suggested in the study have not seemed sufficiently conclusive to warrant their presentation. It is, however, possible to say that where the moisture percentage was found to fall below the wilting point there was also found a definite falling off in the rate of alfalfa growth.

[2] For seasonal duty on individual farms see Cal. State Dept. Engineering, Bul. No. 1, pp. 51-53.

TABLE No. 21.

Summary of Seasonal Duty of Water for Alfalfa on 62 Sacramento Valley Farms, 1913 and 1914.

	March, per cent	April, per cent	May, per cent	June, per cent	July, per cent	August, per cent	September, per cent	October, per cent
Gridley	----------	----------	28.42	20.86	20.22	18.43	12.07	----------
Los Molinos	----------	----------	18.57	19.23	24.10	18.71	18.29	1.10
Orland	6.46	5.46	23.69	18.46	18.55	15.07	9.46	2.85
Willows	----------	----------	19.17	21.83	16.17	27.83	15.00	----------
Woodland	14.86	----------	16.47	17.10	31.05	7.09	11.67	1.76
Dixon	4.14	10.43	14.28	16.00	20.00	13.57	14.87	6.71
Averages	5.18	1.75	20.21	18.76	23.40	15.34	13.61	1.75

NOTE.—Averages for entire valley figured from all farms and not from section averages.

Cost of Irrigating and Handling Alfalfa in Sacramento Valley in 1914.

Records were kept in 1914 of the cost of irrigating and handling alfalfa in the sections of Sacramento Valley where alfalfa duty of water determinations were being made. The items covered the cost of cutting, raking, shocking, stacking and baling. The average total cost of the first four of these items was $1.88 per ton. The cost of baling in Sacramento Valley ranged from $2 to $2.25 per ton. The prevailing prices of labor in Sacramento Valley were $2 to $2.50 per day per man and $1 per head for stock. The usual price for a man applying water was 25 cents per hour. The data gathered, averaged for the separate sections and for all of them taken together, are summarized in Table No. 21.

TABLE No. 22.

Cost of Irrigating and Handling Alfalfa, Sacramento Valley, 1914.

Area	Annual cost of irrigation per acre		Total cost of handling crop, per ton of hay						Total seasonal cost of handling crop, per acre	Total of all irrigation and handling costs, per acre
	Applying water, including cleaning of ditches where this is a factor	Water charges, or cost of pumping¹	Cutting	Raking	Shocking	Stacking	Baling	Moving baled hay		
Woodland average	$0 92	$2 56	$0 28	$0 14	$0 20	$0 79	$2 14	$0 65	$12 79	$16 51
Los Molinos average	1 61	2 00	50	21	26	82	-------	-------	10 35	13 95
Orland average	2 14	2 00	53	23	34	89	-------	-------	11 46	15 59
Willows average	1 25	1 75	67	36	30	1 09	-------	-------	7 23	10 23
General average	$1 48	$2 08	$0 49	$0 23	$0 27	$0 89	-------	-------	$10 45	$14 07

[1] Do not include interest, depreciation, etc., or other similar "overhead" charges.

In comparing the costs for the different areas it should be borne in mind that the cost of water, the number of irrigations, and the number of crops cut were not the same in the different sections. For instance, the highest cost per acre was at Woodland, where the charge for water was higher than elsewhere. The lowest cost was at Willows, where it was found more profitable to pasture the fields after two or three crops had been removed. The cost of applying water at Orland was about double that of other sections owing to the larger number of irrigations given between cuttings. The usual price received for alfalfa hay in 1914 was $4 per ton in the stack and $6.50 per ton baled.[1]

SUMMARY AND CONCLUSIONS.

1. This bulletin discusses observations of the duty of water made under the direction of the Office of Experiment Stations or the Office of Public Roads and Rural Engineering from 1910 to 1915, inclusive, at the California University Farm at Davis, on 54 Sacramento Valley alfalfa farms near Gridley, Los Molinos, Orland, Willows, Woodland, and Dixon, during 1913 and 1914, and on an experimental tract near Willows in 1915.

2. Soils, representative of extensive areas in Sacramento Valley, including the Madera, Gridley, Vina, Tehama, Elder, and Yolo series, were included in the investigations. The various fields represented classes of soil varying in texture from the gravelly loams of the Elder series to the clays of the Tehama series.

3. The water used on the alfalfa fields was measured by current meters or weirs and its underground distribution was ascertained by soil borings shortly before and shortly after irrigations and by about 11,000 soil moisture determinations.

4. Average annual depths of water applied were found to vary from 1.83 feet in the Willows area to 5.15 feet in the Los Molinos area, and on a single field the smallest annual application was 1.04 feet on a clay loam, as compared to 9.59 feet, on a gravelly loam, both of which were at Orland.

5. With the exception of the highly permeable Elder gravelly loams at Orland and the very impervious Tehama clays and clay loams at Willows, the results of the work, as a whole, are in agreement with the results of the six-year duty of water study at Davis. These have indicated that a depth of from 30 to 36 inches of water annually is the most desirable quantity of irrigation water to apply under general Sacramento Valley conditions. Total depths of less than 24 inches annually, exclusive of rainfall, are insufficient for satisfactory yields as indicated by the Willows work, while application of depths of 48 or more inches per year do not produce corresponding increases in alfalfa yields.

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[1] For detailed costs on the individual farms see Cal. State Dept. Engineering Bul. No. 1, pp. 30-31.

6. Not counting the experimental plats at Davis or at Willows, moisture determinations were made chiefly on 15 fields, of which 13 were of silt loams or clay loams. In the case of all but one of these loam soils, for which one the full capacity of the soil to retain water was not satisfied, the average quantity of irrigation water retained per irrigation in the upper six feet of soil was equivalent to a depth of only 4.31 inches, or only 32.6 per cent of the average individual applications, and only 0.72 acre-inch per acre per foot in depth of the soil. Although the roots of alfalfa penetrate in these soils to a greater depth than six feet, it is plain that a considerable portion of the irrigation water went below the zone of greatest root activity and was largely or wholly wasted.

7. Considering the quantities of irrigation water retained in the upper six feet of soil for all of the fields for which soil moisture determinations were made, it is found that the average quantity retained in the lighter and more permeable soils was 0.92 acre-inch per acre for each foot in depth of soil, or the equivalent of five to six acre-inches per acre for six feet of soil, whereas the clay soils absorbed an average of only 0.37 acre-inch per each acre-foot of soil, or at the rate of only about two and one-quarter acre-inches for six acre-feet, due to their great imperviousness in their present condition. In the surface foot, however, the light soils retained an average of 1.04 acre-inches per acre-foot of soil as compared to 1.71 acre-inches per acre-foot held by the clay soils, this being in accordance with the well-known fact that clay soils, when thoroughly wetted, will hold much more soil water than soils of coarser or ''lighter'' texture.

8. Averaging the quantities of irrigation water retained by each field for which moisture determinations were made, it is found that the maximum quantities retained per acre-foot of soil per irrigation were 1.02 acre-inches for the silt loams with fine sandy subsoils, 0.75 acre-inch for the silt loams without fine sandy subsoils, 0.78 acre-inch for the clay loams, and 0.49 acre-inch for the clays.

9. Considering only the moisture determinations from the surface foot of soil of the 15 farms and the three Willows experimental plats for which such determinations were made—in each case the surface foot held its full capacity of irrigation water—it is plain that, in the case of the typical silt loam soils of Sacramento Valley, single applications of irrigation water exceeding depths of one to one and one-half inches per foot in depth of soil it is necessary to moisten accomplish no useful purpose. While the typical clay loams and clays of Sacramento Valley will retain against gravity in their normal growing condition as much as one and one-quarter to one and three-quarters acre-inches of irrigation water per acre-foot of soil, over and above the amount normally found in such soils under Sacramento Valley field

conditions, that amount of irrigation water will not be absorbed by these soils unless it is applied very slowly.

10. The wilting percentages or "wilting coefficients" for the Sacramento Valley soils under investigation ranges from 10.35 in the case of the silt loams of the experimental irrigation tract on the University Farm, at Davis, to 16.59 in the case of clay loam on the same tract. The average wilting percentages for the several types of soil under observation were 10.65 for the silt loams with fine sandy subsoils, 13.12 for the other silt loams, 14.21 for the clay loams, and 13.06 for the clays. The approximate quantities of water necessary to apply to thoroughly dry soils of the types listed to bring the moisture content up to the wilting points given are, in inches in depth per foot of soil, 1.5 for the silt loams with fine sandy subsoils, 2 for other silt loams, 2.3 for the clay loams, and 2.6 for the clays.

11. The optimum percentage of available soil moisture for Sacramento Valley alfalfa soils, over and above the percentage at which wilting occurs, seems to average between four and six per cent. This is equivalent to depths of from 0.6 to 0.9 inch of irrigation water per foot of soil for loam soils and of from 0.7 to 1.2 inches per foot of soil for the heavier clay loams and clays.

12. Alfalfa planted on very open and very impervious soils should be irrigated more than once between cuttings. This is necessary in the case of the open soils because of the inability of such soils to retain all of the moisture needed to mature a crop, and in the case of the impervious clay soils in order to accomplish deeper penetration of the irrigation water into them. In the case of the latter soils it is very desirable that the moisture supplied by winter rains shall be supplemented by irrigation water sufficiently early in the spring to prevent drying out. The frequent use by irrigators on such soils of a soil auger is to be urgently recommended, the investigations reported herein having demonstrated that penetration of irrigation water into the clay soils is very much less than irrigators usually realize.

13. Under the present general practice on the Sacramento Valley alfalfa farms under observation, the applications of irrigation water, expressed in cubic feet per second per acre, averaged 23 for gravelly loams, 10.9 for sandy loams, 8.8 for silt loams, 7.3 for clay loams, and 3.2 for clays. As checks seldom are as much as one acre in area, the actual irrigating heads usually were less than these figures. Where excessive quantities of irrigation water have been applied the reason very frequently has been the use of too small irrigating heads or of too large checks. Additional data are necessary to give a satisfactory basis for definite recommendation as to rates of application. It is already clear, however, that irrigating heads that are not large enough to enable

alfalfa checks to be watered evenly with six acre-inches of water per acre per irrigation are too small, and the remedy is either larger irrigating heads or smaller checks, preferably the latter, especially in the case of the smaller holdings.

14. Dimensions and grades of alfalfa checks vary somewhat in the six sections of Sacramento Valley studied. Some square and rectangular checks are used in each section but border or "strip" checks are most common, except on the gravelly soils at Orland, where the most satisfactory check probably is one about 100 feet square, containing a little under one-fourth acre, and with each check having direct access to a field lateral to do away with carrying water to one check over another. The border checks range from 30 to 120 feet in width and from 60 to 1,750 feet in length, the most usual width being from 30 to 50 feet and the most usual length from 400 to 700 feet. The grades of border checks range from 0.6 to 12 inches per 100 feet and average 3.6 inches per 100 feet.

15. Irrigation of alfalfa in Sacramento Valley is confined to the months March to October, inclusive, and in 1913 and 1914 it was confined to the months May to September, inclusive, at Gridley and Willows, and May to October, inclusive, at Los Molinos. Considering the entire six districts in which the investigations were made, the average percentage of the total annual use that was applied in each month of the irrigation seasons of 1913 and 1914 was as follows: March, 5.18; April, 1.75; May, 20.21; June, 18.76; July, 23.40; August, 15.34; September, 13.61; October, 1.75.

16. The general averages of the various items making up the cost of irrigating and handling alfalfa in Sacramento Valley in 1914 on 28 farms were as follows: Applying water, including cleaning of ditches, \$1.48 per acre; water charges, or cost of pumping, \$2.08 per acre; cutting, \$0.49 per ton; raking, \$0.23 per ton; shocking, \$0.27 per ton; stacking, \$0.89 per ton; total for handling crop, per acre, including cost of baling, \$10.45 per acre; total of all irrigation and handling costs, \$14.07 per acre.

STATE OF CALIFORNIA
DEPARTMENT OF ENGINEERING

APPENDIX D

Preliminary Report on Conservation and Control of Flood Water in Coachella Valley, California

By C. E. TAIT, Irrigation Engineer, Office of Public Roads and Rural Engineering, United States Department of Agriculture. : :

(Based on data gathered under cooperative agreement between the Office of Public Roads and Rural Engineering of the United States Department of Agriculture, the California State Department of Engineering, and the University of California Agricultural Experiment Station and reprinted from the Fifth Biennial Report of the Department of Engineering.)

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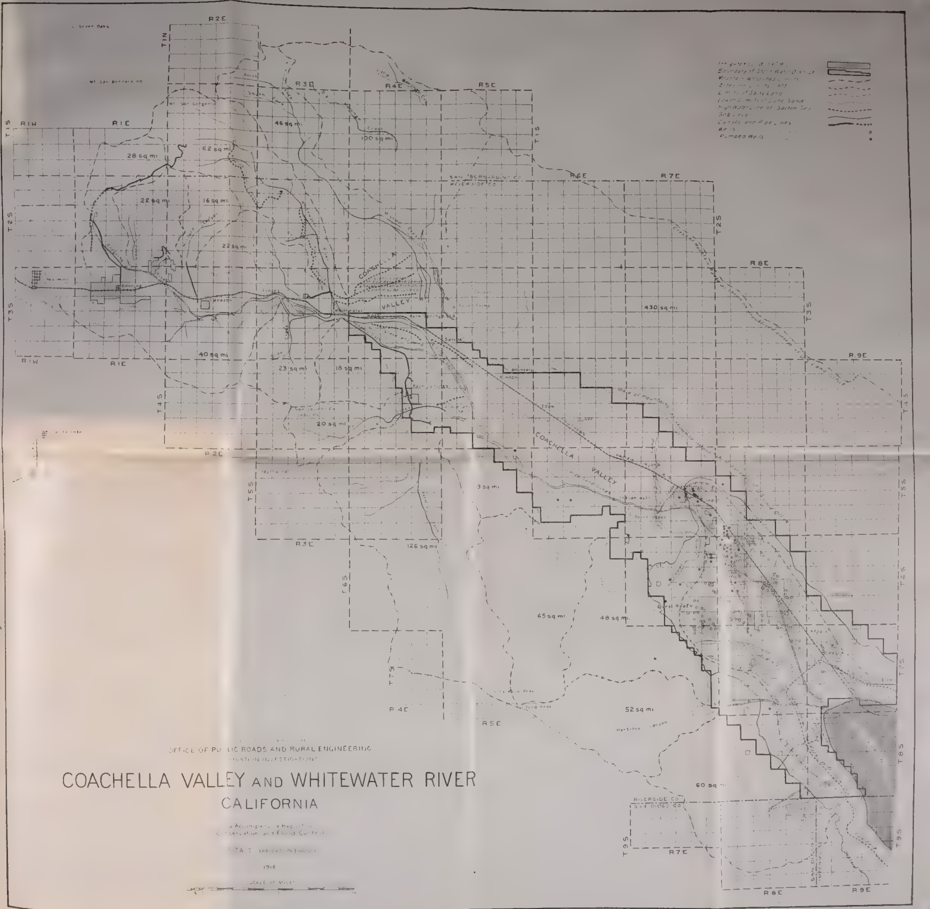
PLATE I



OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING
IRRIGATION INVESTIGATIONS

COACHELLA VALLEY AND WHITEWATER RIVER
CALIFORNIA

To Accompany a Report on
Conservation and Flood Control

[illegible]

1916

PRELIMINARY REPORT ON CONSERVATION AND CONTROL OF FLOOD WATER IN COACHELLA VALLEY, CALIFORNIA.

By C. E. TAIT, Irrigation Engineer, Office of Public Roads and Rural Engineering, U. S. Department of Agriculture.

Description.

Coachella Valley is located in Riverside County, California, east of divide between Pacific Ocean and Colorado Desert, and it comprises a neck of the desert which slopes southeastward from the summit of the Coast Range towards the Salton Basin, the lowest depression of the desert. The valley has not taken its name from any stream which enters or crosses it and it might have been named after Whitewater River, which is the trunk of its drainage. The territory to be considered in connection with the conservation and storm water problems of Coachella Valley may for convenience be divided into a number of general divisions which are best understood by reference to the accompanying map, Pl. I.

Valley Areas.

Beginning at the northwestern extremity of the territory, it is instructive to consider three general areas, the eastern slope of San Gorgonio Pass, Coachella Desert and Coachella Valley. San Gorgonio Pass is flanked on north and south by the higher mountains of the Coast Range and it collects much of the drainage of the headwaters of Whitewater River. The divide is between Beaumont and Banning and the pass extends eastward to Whitewater. This area contains 32,000 acres. Coachella Desert extends from Whitewater to Point Happy and contains 78,000 acres. Coachella Valley extends from Point Happy to the Salton Basin and contains 145,000 acres.

Drainage Areas.

The limits of the mountain watersheds of Whitewater River and tributaries are shown on the map by dashed lines. The sheds may be considered in groups. The two most important are the southeastern slopes of the San Bernardino Mountains culminating in Mt. San Gorgonio and lying north of San Gorgonio Pass and the northeastern slopes of the San Jacinto Mountains lying south of the pass and centralized around the peak of the same name. The northeastern slope of the Santa Rosa Mountains draining into Coachella Valley on the southwest side is of less importance, while the drainage toward the valley on the northeast side is of little consequence.

The area of mountain watershed is as follows:

	Square miles.	
San Bernardino Mountains, drainage to San Gorgonio Pass—		
San Gorgonio River	28	
Potrero and Hathaway creeks	22	
Millard Canyon	16	
Streams between Millard Canyon and Whitewater River	22	
Whitewater River	62	
		150
San Bernardino Mountains, drainage to desert—		
Mission Creek	46	
Big and Little Morongo creeks	100	
		146
San Jacinto Mountains, drainage to San Gorgonio Pass—		
Small streams above Snow Creek	40	
Snow Creek	23	
		63
San Jacinto Mountains, drainage to desert—		
Streams between Snow and Tahquiz creeks	18	
Tahquiz Creek	20	
Palm Canyon	126	
		164
Santa Rosa Mountains, drainage above Point Happy—		
Streams between Palm and Deep canyons	19	
Deep Canyon with Dead Indian Creek	65	
		84
Santa Rosa Mountains, drainage below Point Happy—		
Streams between Deep and Martinez canyons	48	
Martinez Canyon	52	
Streams below Martinez Canyon	60	
		160
Eastern extension of San Bernardino Mountains, drainage—		
Streams between Morongo Creek and Salton Sea		430
Total		1,197

Whitewater River is the largest stream of the mountain drainage in both maximum rate and annual amount of discharge. Its watershed, although not the largest, embraces a larger area at high elevation than any other branch and its summer flow is kept up by the slow melting of snow on Mt. San Gorgonio. This stream falls from an elevation of 11,485 feet at the summit of the peak to 1,400 feet at the mouth of the canyon in 20 miles, or at the rate of 504 feet per mile. The mouth of Whitewater Canyon is shown by Pl. II, Fig. 1.

San Gorgonio River is a more extended branch of the Whitewater drainage than the Whitewater itself and is the second stream in size entering San Gorgonio Pass. Millard Canyon and Potrero Creek flow in small amount through the summer.

Mission and Big and Little Morongo creeks, although having a large watershed, do not drain an area of as high precipitation as streams entering the pass.

Snow Creek, which drains the north slope of Mt. San Jacinto, and Tahquiz Creek, which drains the eastern slopes of San Jacinto and

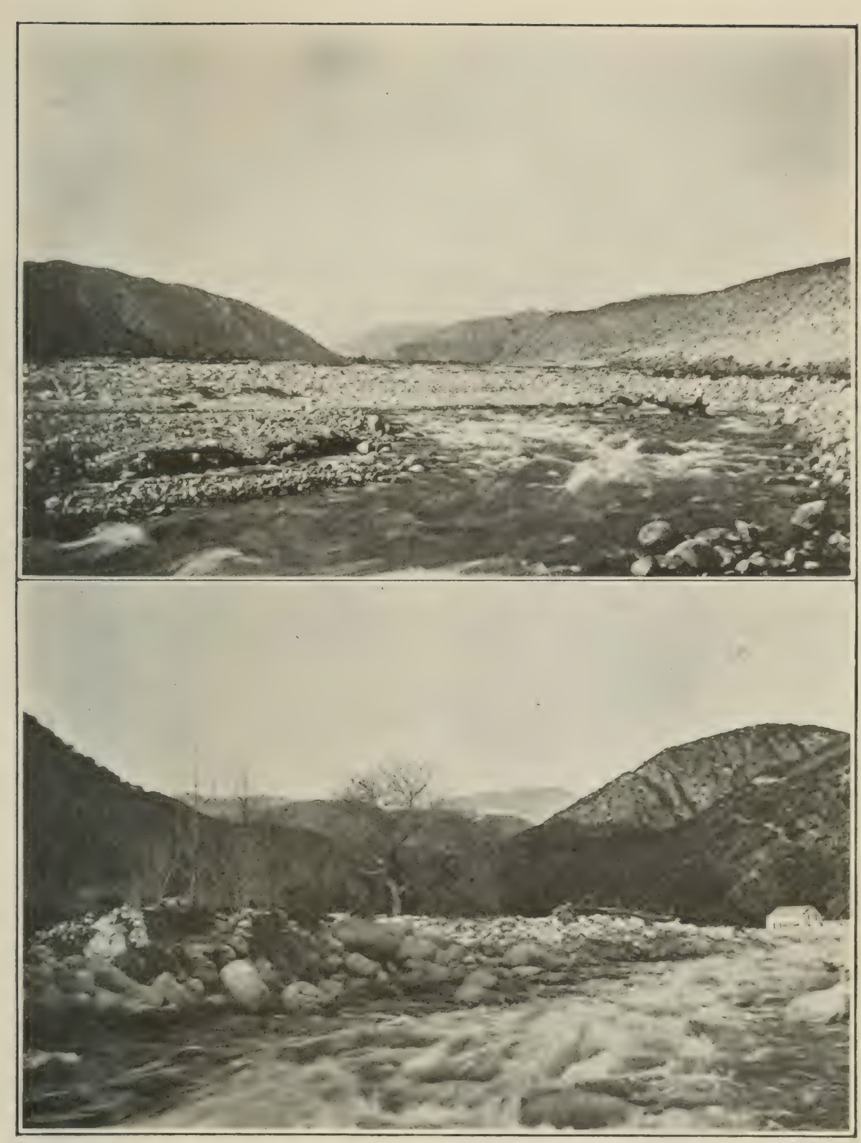


Plate II, Fig. 1 (upper).—Looking up stream at mouth of Whitewater Canyon April 3, 1916, showing coarseness of gravels at the head of the debris cone. Fig. 2 (lower).—Mouth of Santa Ana Canyon.

Tahquiz peaks, are remarkable for being precipitous. It is doubtful if their grades are equaled by those of any other streams of equal or greater length in western United States. Snow Creek falls from the summit of Mt. San Jacinto at elevation of 10,805 feet to 1,250 feet in San Gorgonio Pass, or at the rate of 1,365 feet per mile for its entire length, while Tahquiz Creek falls 10,305 feet from the same summit to the desert at Palm Springs in 10 miles at the rate of 1,030 feet per mile. The flow of Tahquiz Creek is much more constant than Snow Creek for the reason that the former has its source in mountain flats, while the latter is precipitous from its extreme source. Pl. III, Fig. 1 is a view of Tahquiz Creek at Palm Springs.

Palm Canyon, shown by Pl. IV, Fig. 2, has the largest watershed of any tributary of the Whitewater, but the shed is not so high as others and the length of the canyon, 20 miles, regulates the discharge so that its floods are not troublesome.

Deep Canyon drains the north slope of the summit of the Santa Rosas with elevation of 8,705 feet, and while the rainfall here is much less than on the San Bernardinos and San Jacintos, the stream is of some importance in the flood water problem owing to the fact that it empties into the valley only a few miles above the agricultural lands and at a point so far down the valley that its discharge occurs on silt rather than on the more absorbent gravels.

Martinez Canyon enters the valley so near the lower end that its floods do not menace property to great extent, although a well-defined debris cone below the mouth of the canyon gives evidence of the occurrence of storm water. The crest of the range and the base line of the eastern extension of San Bernardino Mountains are shown on the map from the unpublished plats of new surveys of the United States Land Office. This area is large, but the run-off is very light.

Stream Discharge.

Unfortunately there are but few records of measurements of the discharge of Whitewater River and tributaries. The only authentic measurements available are the following fragmentary measurements by the United States Geological Survey:

Whitewater River.

Feb. 16, 1898.	At foot of Bear Valley trail	14.20 sec. ft.
Feb. 17, 1898.	Two miles above mouth	17.80 sec. ft.
Feb. 17, 1898.	North fork at mouth, 5.64 sec. ft. Middle fork at mouth, 0.82 sec. ft. South fork at mouth, 7.42 sec. ft.	12.88 sec. ft.
Mar. 4, 1899.	At mouth	2.52 sec. ft.

Snow Creek.

Feb. 22, 1898.		4.50 sec. ft.

On April 3, 1916, the following estimates of discharge were made from observation:

Whitewater River at mouth of canyon	75 sec. ft.
San Gorgonio River at S. P. railroad	20 sec. ft.
Millard Creek at S. P. railroad	5 sec. ft.
Tahquiz Creek at mouth of canyon	30 sec. ft.

On this date Palm Canyon at mouth, Deep Canyon at mouth, and Guadalupe Creek at mouth were dry, although all were reported to be flowing in the canyons. Martinez Canyon was not visited, but was probably flowing in the canyon but not in the wash below the canyon. Snow Creek was discharging a small stream down the side of Mt. San Jacinto, but the water was not reaching Whitewater as surface flow. It was also observed that the combined waters of San Gorgonio River and Millard Creek were sinking just above the point of rocks between Cabazon and Fingal and that the flow of Tahquiz Creek was being lost about three miles below the canyon. On March 29, 1916, the water in Whitewater River was all disappearing in the vicinity of Palm Springs station and no surface water from Mission Creek was reaching as far down as the Southern Pacific Railroad. These measurements and observations give but little idea of the flood discharge.

Character of Watershed.

Most of the mountain watersheds of the Whitewater and tributaries in San Bernardino Mountains, San Jacinto Mountains and some of those in Santa Rosa Mountains are within the national forest reservations. Mt. San Gorgonio and Mt. San Jacinto reach above timber line, which in southern California is at about 9,000 feet elevation. Generally the northern slopes of the mountains are more heavily timbered than the southern, but this does not hold true for Mt. San Jacinto because its northern slope is of granite and so precipitous that trees have little chance to take root. Pine timber grows on the upper slopes of the San Bernardinos and San Jacintos and the lower slopes are generally covered with brush consisting mainly of sumac, mountain mahogany, buckthorn or wild lilac, and chamiso, commonly called greasewood. The growth on Santa Rosa Mountains is more sparse, while the eastern extension of the San Bernardinos is nearly barren of chaparral.

Precipitation.

The only rainfall stations maintained by the United States Weather Bureau within the Whitewater drainage have been at Indio, Palm Springs and Salton in the valley, and at Cabazon in the mountain pass. The gage at Beaumont is nearly within the area while that at Seven Oaks in San Bernardino Mountains and that at Idyllwild in San

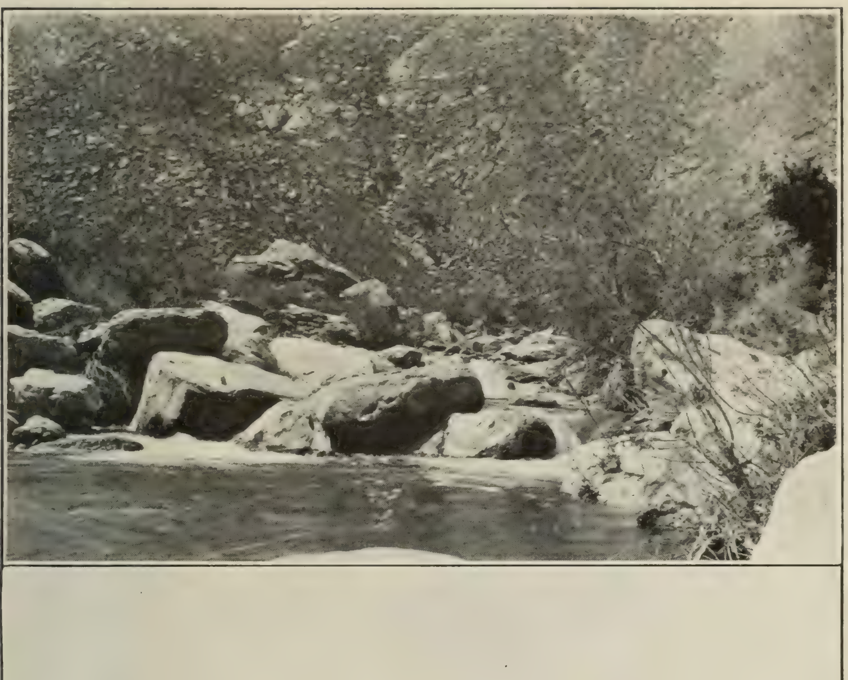


Plate III, Fig. 1 (upper)—Tahquiz Creek at Palm Springs. This stream is one of the most precipitous in the United States, falling 1,030 feet per mile. Fig. 2 (lower).—Looking up Whitewater channel to Point Happy. Mount San Jacinto in the distance.

Jacinto Mountains are a few miles over the divide on western slopes where the precipitation is greater than at the same elevation on the eastern slopes. The recorded seasonal rainfall in inches for these stations is as follows:

	Indio, elevation 20 ft.	Palm Springs, elevation 584 ft.	Salton, elevation 263 ft.	Beaumont,* elevation 2,690 ft.	Cabazon, elevation 1,779 ft.	Seven Oaks, elevation 5,050 ft.	Idyllwild, elevation 5,250 ft.
1878–79	1.90	----------	----------	----------	----------	----------	----------
1879–80	.40	----------	----------	----------	----------	----------	----------
1880–81	4.65	----------	----------	----------	----------	----------	----------
1881–82	1.50	----------	----------	----------	----------	----------	----------
1882–83	3.04	----------	----------	----------	----------	----------	----------
1883–84	5.60	----------	----------	----------	----------	----------	----------
1884–85	.80	----------	----------	----------	----------	----------	----------
1885–86	.90	----------	----------	----------	----------	----------	----------
1886–87	1.35	----------	----------	----------	----------	----------	----------
1887–88	.95	----------	----------	----------	----------	----------	----------
1888–89	3.83	----------	----------	----------	----------	----------	----------
1889–90	5.56	5.86	4.37	----------	----------	----------	----------
1890–91	2.42	8.57	4.51	----------	----------	----------	----------
1891–92	4.24	3.99	3.88	----------	----------	----------	----------
1892–93	1.63	1.68	.92	----------	----------	----------	----------
1893–94	1.01	3.96	1.59	----------	----------	----------	----------
1894–95	6.01	7.75	1.53	----------	----------	----------	----------
1895–96	.92	4.34	0	----------	----------	----------	----------
1896–97	1.29	0	3.87	20.71	----------	----------	----------
1897–98	2.50	1.69	.85	11.30	----------	----------	----------
1898–99	1.70	2.03	.89	7.78	5.79	----------	----------
1899–00	2.35	4.78	.84	11.28	6.56	----------	----------
1900–01	3.04	4.79	3.70	20.61	11.32	----------	----------
1901–02	.60	1.50	1.38	18.51	7.70	----------	19.43
1902–03	2.35	2.10	3.25	21.87	11.62	----------	26.48
1903–04	2.05	.35	.40	11.98	6.67	----------	14.95
1904–05	5.18	9.35	9.29	29.30	17.88	----------	35.01
1905–06	4.70	5.70	.58	23.19	18.36	----------	41.66
1906–07	5.83	4.75	5.97	26.08	16.64	----------	30.66
1907–08	3.18	3.03	----------	17.79	8.40	----------	21.31
1908–09	3.13	4.35	----------	----------	16.67	----------	35.34
1909–10	3.60	5.16	----------	----------	----------	----------	25.35
1910–11	2.44	6.47	----------	----------	----------	30.96	27.82
1911–12	2.62	4.05	----------	17.56	----------	17.78	----------
1912–13	3.01	5.38	----------	10.23	----------	13.73	----------
1913–14	2.45	5.72	----------	27.48	----------	38.57	----------
1914–15	5.43	7.35	----------	28.61	----------	41.55	----------
Mean	2.82 37 seas.	4.36 26 seas.	2.66 18 seas.	19.02 16 seas.	11.60 11 seas.	28.52 5 seas.	27.80 10 seas.

*First twelve seasons from private record.

The mean monthly rainfall for Indio, 1877 to 1912, and for Idyllwild, 1901 to 1912, the one being in the valley and the other in the mountains, is as follows:

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Indio	.01	.18	.17	.11	.21	.47	.72	.45	.34	.07	.03	.00
Idyllwild	.50	1.29	.65	.92	2.16	2.27	5.33	4.65	6.60	1.86	1.18	.06

The greatest precipitation for any month during the period for which measurements were made prior to 1916 was as follows:

Station	Rainfall	Month
Salton	5.12	Feb., 1889
Indio	6.01	Jan., 1896
Palm Springs	7.44	Feb., 1891
Cabazon	9.09	Mar., 1906
Beaumont	10.15	Mar., 1906
Idyllwild	16.15	Mar., 1906
Seven Oaks	16.83	Feb., 1915

From all accounts the flood of January 17, 1916, was the highest in 18 years, if not the highest, ever observed in Whitewater River by the settlers of Coachella Valley. The rainfall for January, 1916, was as follows:

Day	Seven Oaks	Beaumont	Cabazon	Palm Springs	Indio
January 1	.65				
January 2					
January 3					
January 4	.50	.12			
January 5	1.02	.35			
January 6					
January 7					
January 8	1.40	.50			
January 9	.25	.26	.20		
January 10	1.01	.50		.80	
January 11					
January 12					
January 13					
January 14	.52	.28			
January 15	.27	1.52			
January 16	5.60	2.08	.20	.30	.94
January 17	6.10	2.20	4.20	1.00	1.10
January 18	3.40	1.71	4.60	1.00	.52
January 19	.43	.70	2.10	.75	
January 20			2.30	.35	
January 21					
January 22					
January 23					
January 24	.25	.56			
January 25	1.00	.67			
January 26	2.25	1.58	.50		
January 27	6.45	2.70	.10	1.00	.97
January 28	.10	.08			
January 29	.35	.35			
January 30					
January 31					
	31.10	16.16	14.20	5.20	3.53

In the absence of measurements the following estimate of the flood of January 17, 1916, based on the run-off of the western mountain slopes of San Diego County, is offered:

	Square miles	Second-feet per square mile	Second-feet
San Bernardino watershed	296	200	5,920
San Jacinto watershed	227	150	3,400
Santa Rosa, above Point Happy	84	100	840
Total at Point Happy			10,160

It is difficult to make comparisons between streams on the eastern and western slopes of the mountains as the conditions are different. The precipitation for a year or a month or perhaps for a day is greater on the western than on the eastern slopes, but the precipitation for a storm of a few hours duration is sometimes very heavy on the eastern side of the range and the short but violent storms may cause heavy floods. Another difference is in the rapidity of run-off. The slopes are steeper on the desert side of the range and there is less vegetation to retard the run-off than in the more humid territory draining to the Pacific Ocean.

Use of Surface Water.

Irrigation development in Coachella Valley will be limited by the amount of water available. Only a small proportion of the land can be irrigated from the Whitewater drainage. The normal summer surface flow of the streams, excepting that from Whitewater Canyon, is already all appropriated and used for irrigation. The flow of San Gorgonio Canyon, which averages about 11 second-feet in summer, is diverted and used by the Banning Water Company at Banning. The company claims the entire flow and has a system for the irrigation of 2,700 acres. The stream supply is supplemented by wells below the canyon. The company spreads flood water over the gravel cone below the canyon in winter for the benefit of the wells.

The flow of Potrero Creek is used by the Indians for the irrigation of 1,300 acres of land on the Morongo reservation. The discharge of Millard Canyon is conveyed to Cabazon where it is used on lands under the system of the Cabazon Water Company. Mission Creek supplies water to 160 acres on the Mission Creek Indian reservation at the mouth of the canyon. Tahquiz and Andreas creeks furnish water for 200 acres on the Agua Caliente Indian reservation at Palm Springs and the area irrigated on this reservation is to be doubled. A small area is also irrigated on the Santa Rosa reservation at the headwaters of Palm Canyon.

A small ditch diverts water from the Whitewater at the mouth of the canyon for use on a single ranch. The Rogers Ditch takes water from the river at the point of rocks near Whitewater and carries it eight miles to Palm Springs settlement where the water is sold to users. This conduit is cobble-lined and has a capacity of seven second-feet.

About 1913 the Consolidated Reservoir and Power Company completed a conduit which diverts water from Middle and South Forks of Whitewater River in the mountains at 7,000 feet elevation and carries it six miles across the divide to San Gorgonio River from which it is used for irrigation at Banning. This conduit is in the main a concrete lined ditch 24 inches deep by 18 to 20 inches wide on a grade of 20 feet per mile, constructed to carry two and one-half second feet. Two undertakings known as the Pluth projects solely for the development of power on the headwaters of the Whitewater have been proposed. Rights of way through the forest reservation have been secured but the works have not been constructed. Several small private ditches which do not have a permanent water supply are located in canyons along the southwest side of the valley and mountain pass and late water filings have been made on Snow Creek and other streams in the pass, but so far as is known the claims have not been followed by construction, appropriation and use. Ditches and main pipe lines are shown on the map in heavy solid lines and projected power development conduits are shown in heavy dotted lines.

Underground Waters.

All irrigation in Coachella Valley below Point Happy is from wells. The underground water on which the wells are dependent has its source in the precipitation over the mountain drainage. The light rainfall on the valley and desert areas is mainly disposed of by evaporation in the dry atmosphere. Except for short and infrequent periods of high flood, all water not diverted by ditches is taken up by the gravels on which the canyons debouch.

During the summer or season of regular irrigation in San Gorgonio Pass but little water is allowed to reach the gravel cones from any but Whitewater Canyon. This stream normally sinks between the canyon and Palm Springs Station. The water absorbed by the gravels below the canyons moves toward Salton Sea and its gradient conforms in general to the slope of the land. If more borings were made between Whitewater Canyon and Point Happy it is probable that a number of different water planes might be established. As would be expected, a cienega is located just above Point Happy where the ground water is held up nearly to the surface by the obtrusive granitic point giving rise to the old Indian wells. Pl. III, Fig. 2 is a view of Point Happy with San Jacinto Peak in the distance.

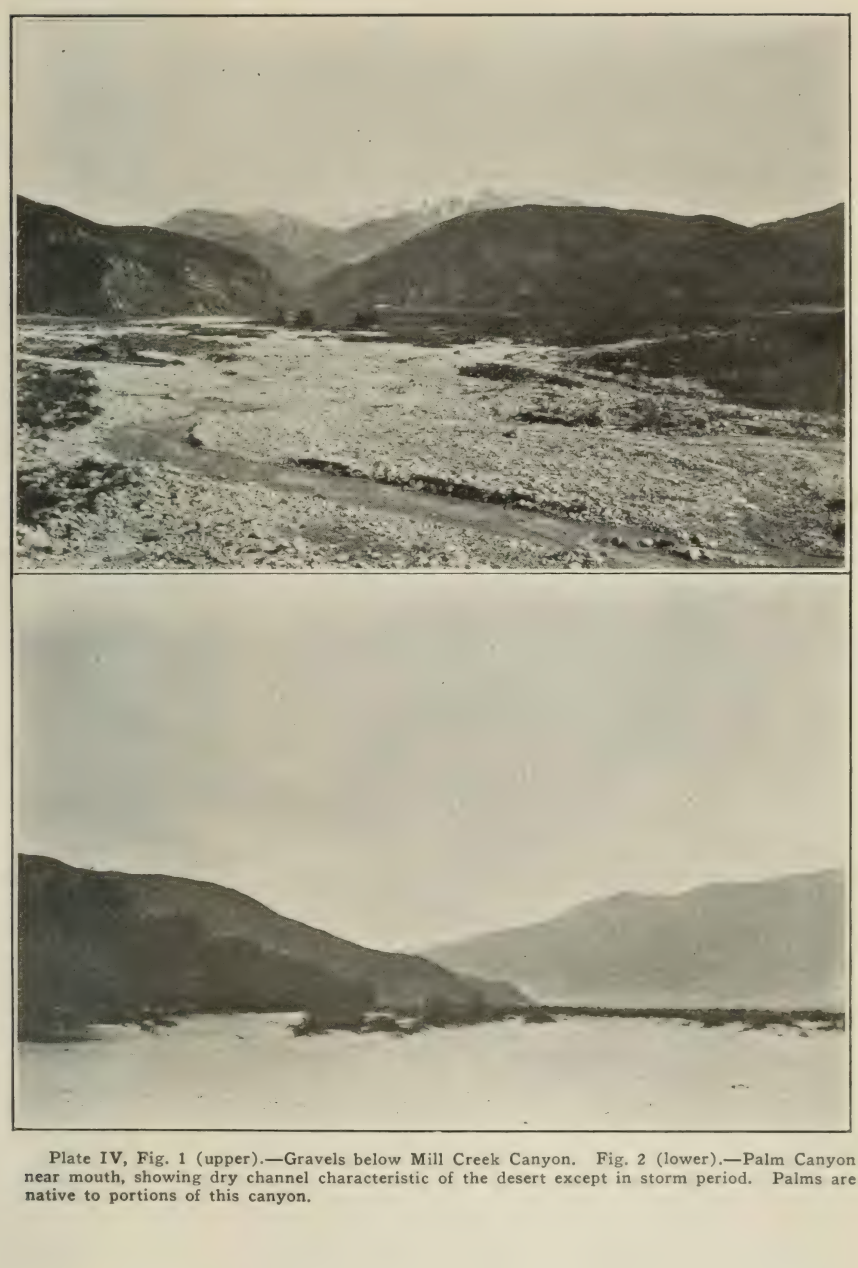


Plate IV, Fig. 1 (upper).—Gravels below Mill Creek Canyon. Fig. 2 (lower).—Palm Canyon near mouth, showing dry channel characteristic of the desert except in storm period. Palms are native to portions of this canyon.

Effect of Precipitation on Underground Water.

The rate of movement of the underground water is very slow. The highest rate of movement found for subterranean flow of such streams in southern California as San Gabriel, Los Angeles and Mojave rivers was about five miles per year, while the fluctuations in ground water levels generally lag one year or more behind seasons of heavy precipitation in the mountains. Owing to the distance and to the fine materials through which the water must percolate it is probable that it takes more than two years for the effect of precipitation to reach the artesian basin in the valley. This slow travel of the water regulates the effect at the lower end of the valley so that there is little noticeable response in the ground water level to a single year's precipitation, but a relation between source and destination must exist and for reasonable permanence in the ground water level the output from wells in the valley can not in general exceed the input to the gravel cones above.

Slope of Land and Water Plane.

The grade from Banning to Palm Springs station is 82 feet per mile, from Palm Springs to Indio 30 feet per mile, and from Indio to Mecca 17 feet per mile. Direct comparison can not be made between the profiles of the water plane and the land surface, for no wells have been bored along the railroad track above Indio.

Some idea of the water gradient may be had from the following: Water was struck at 72 feet, and it rose to 45 feet from the surface in the Warner well in Sec. 14, T. 3 S., R. 4. E., at Seven Palms. The well in SE. $\frac{1}{4}$ Sec. 18, T. 3 S., R. 5 E. flows lightly, probably due to interception of the underflow of Mission Creek by the hills near Seven Palms. The well located in Sec. 2, T. 5 S., R. 5 E., and on Whitewater wash about midway between Palm Springs and Point Happy, reaches water at 87 feet, and is 153 feet deep, penetrating 60 feet of water-bearing gravel. The McDonald well in Sec. 20, T. 5 S., R. 6 E., and three and a half miles above Indian Wells, reaches water at 100 feet. This well is 250 feet deep and delivers one second-foot when pumped. Another well being drilled on the same site is now at 420 feet, and is to be 700 feet deep. Springs and shallow wells dug show the ground water to be practically at the surface at Indian Wells, one mile above Point Happy. The underground water is here held up by the extension of the point now buried by the alluvium. After passing over or around the intercepting ridge, it soon drops to a lower level for the wells on the date orchards one mile west of Indio and at sea level reach water at 50 feet. Below Indio the water plane appears to have a uniform slope about one-half as great as the ground surface until it meets the surface at the edge of the artesian area between Coachella and Thermal at elevation

100 feet below sea level. The logs of wells drilled in the valley show alternating layers of clay, sand and gravel with various arrangements.

Wells.

Development of Coachella Valley began about 1894 and most of the wells have been drilled since 1900. Including irrigation and domestic wells, over 400 have been drilled, of which 300 originally flowed. About 1900 the artesian area included practically all land below the 100-foot contour below sea level and land around Indio up to the sea level line, an area of 140 square miles. Owing to the boring of new wells with increased draft on the basin and the effect of dry years 1897 to 1904, the artesian area contracted since 1905. The recession of the underground water level has apparently been to some extent checked by the seasons of more plentiful rainfall beginning 1905, yet the general tendency is to lower, and at present no wells above Coachella flow. The 100-foot contour below sea level about midway between Coachella and Thermal is approximately the upper limit of the artesian area at present, while at the sides of the valley the limits are lower, the area being only about one-half the original.

During the early period the wells were generally bored to depths of 400 or 500 feet. After the reduction of the artesian area some wells were bored 800 to 1,200 and one 1,400 feet deep, penetrating lower water-bearing strata. These gave larger and stronger flows than the more shallow wells, but it is not certain that the flow from the lower strata will be more permanent than from the upper. At the present time most of the drilling is to depths of about 600 feet, for if pumping must be resorted to, a medium depth gives as good results as a greater depth of well. The wells as located by the United States Geological Survey in 1907 are shown on the map in small circles. Those with a dot within the circle indicate pumped wells. About 150 wells, including some that flow lightly, are now pumped. The flow of the wells is generally less than one-half a second-foot. Some deliver over one second-foot when pumped. The water from the wells is of good quality. The temperature of most of the well water ranges from 75 to 90 degrees, the higher temperatures being for wells near Salton Sea. A new well near Martinez is reported to produce water with temperature of 106 degrees. The discharge of weak wells or small pumps is often accumulated in small earthen unlined reservoirs, from which a multiple head is applied to the land at intervals more economically than if the discharge of the well be used directly. The large majority of wells and pumping plants are owned by individuals or neighbors in partnership, there being only a few incorporated companies.

Effect of Salton Sea on Underground Water.

The percolating water which is confined beneath certain strata has its movement directed towards the Salton basin, where before the late inflow of Colorado River the moisture escaped by evaporation from the bottom of the basin. During 1905 and 1906, Salton Sea was so bountifully replenished by the Colorado that the water reached a maximum elevation of 197 feet below sea level and a depth of 76 feet over the bottom of the old salt marsh in February, 1907, when the river was turned back to the Gulf of California. Since that time the water in the newly-formed sea has been lowered by evaporation and the level January 1, 1916, was 237 feet below sea level. The present area of Salton Sea is shown on the map in cross hatch, while the high-water line of 1907 is shown by dotted line.

The effect of water in the Salton Basin has probably been to stay the escape of the underground water percolating toward it and to add to the artesian pressure in Coachella Valley, although due to the overbalance of other influences the artesian pressure has in general diminished since the late formation of the sea.

Maintenance of Salton Sea.

The question of the wisdom of maintaining the present status of Salton Sea has been raised, but it can not be considered with reference to Coachella Valley alone. The land now submerged in Coachella Valley contains over 3 per cent of alkali and is too salty for agricultural purposes. The land in Imperial Valley at the southeast end of the lake that was covered by the high water but from which the water has now receded is good soil, and most of it is now being farmed. As the water recedes the land is being applied for under the Desert Act. During the inflow into Salton Basin in 1905 and 1906 much silt was deposited about the mouths of New and Alamo rivers and as the lake recedes the water line is found to be much different than when the water was rising. The deltas built out have light slope and a small reduction in the gage exposes a large area of land. Some of the area covered was sand dune land. The water leveled the dunes and spread a crust of silt over the sand. The inflow is at present controlled by the Imperial Irrigation District and the mutual water companies of Imperial Valley. Flood waters in Colorado River are prevented from entering the sea through New River by levees in Mexico. Seepage water from Imperial Valley lands and waste water from the irrigation ditches flows to the sea through New and Alamo channels. Much of the waste water, of which most is in the Alamo, is being appropriated for irrigation of low lands near the sea and the amount of water entering the sea is more likely to diminish than to increase in the future.

The loss by evaporation from the lake has been enough greater than the inflow to lower the water surface at the rate of about four feet per year since the high level of 1907 occurred. In case of accidental break in the Colorado River levees and another season of inflow, it would be desirable for the protection of farm lands in Imperial Valley to have a large unoccupied catchment basin in Salton Sink to receive the water.

The contract for the recent transfer of the Imperial Canal by the Southern Pacific Company to the Imperial Irrigation District provides, among other things, that the district shall not permit water to flow into Salton Sea in excess of an amount that would raise the water level on the railroad lands more than three feet over the highest level of the preceding year. Since the evaporation is now four feet per annum and as the rate will increase as the area becomes smaller, the water is expected to diminish. While jurisdiction over Salton Sea may not lie entirely within this contract, the Imperial Irrigation District is now in better position to control Salton Sea than any but the government. The control should not hinge entirely on value of lands subject to inundation. Salton Sea has an area of 300 square miles. To maintain the present level of the lake would require 768,000 acre-feet of water annually, enough for the irrigation of 256,000 acres of land. As there is more good land on the Colorado than the river will irrigate, it is apparent that the water would have a greater value for producing crops than it would have in Salton Sink.

Lands.

The floor of San Gorgonio Pass, away from the numerous stream channels which cross it, is soil well suited to agriculture and horticulture. The expansive cone or fan sloping southeastward from Whitewater Canyon for several miles, grades from boulders and coarse gravels to gravel and sand. The greater portion of the desert from Palm Springs settlement to Point Happy, including the territory along the railroad, is very sandy and the land is dotted with shifting dunes.

The winds which account for the presence of the dunes sweep down from the higher elevations through the eastern end of San Gorgonio Pass and on across the desert to replace the heated atmosphere of Salton Basin. They are so strong and frequent through the central portion of the desert, especially in the spring season, that the region is unsuited to agriculture and the land along the railroad from Palm Springs station to Myoma can hardly be reclaimed even should there be water for it. The town of Palm Springs and lands below Mission Canyon are remarkably well sheltered, while lands along Whitewater wash, below Deep Canyon and at Seven Palms, are far enough out of the track

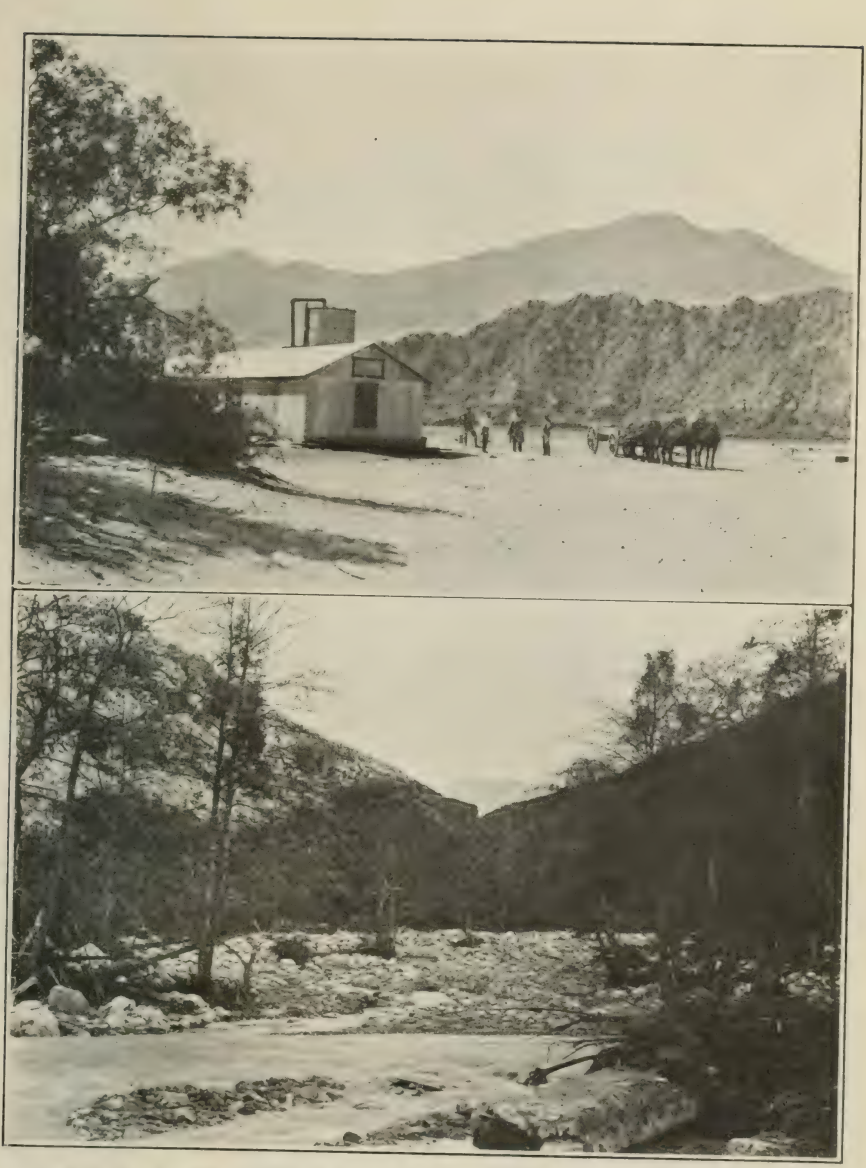


Plate V, Fig. 1 (upper).—One of the old pumping plants on the southwest side of Coachella Valley. The old water line is shown on the coral reef in background. Fig. 2 (lower).—Mill Creek Canyon.

of the violent winds to permit profitable cultivation. Below Point Happy the winds expand over the broader and less confined area of the settled portion of the valley where they lose much of their force. A ridge of mammoth dunes parallels Whitewater wash for several miles at Indian Wells and the stream when flowing is confined between them and Point Happy. The sand dune area extends below the point on the southwest side of the valley. The lower limits of the sand dune area are shown on the accompanying map by dotted line.

From Point Happy to Salton Sea most of the valley is below sea level. The ancient beach line is clearly traced on both sides of the valley and is about 40 feet above sea level. The old water line is shown by the photograph, Pl. V, Fig. 1, on the coral reef at the southwest side of the valley. Apparently the alluvium from the canyons and the desert sands transported by wind have intermingled with the delta silts to form the valley soils. The United States Bureau of Soils has surveyed the soils below Point Happy. The central portion of the valley from Indio to Mecca is in the main classed as sandy and fine sandy loam and the lower part next to Salton Sea as clay. Irregular strips along the edges of the valley are sand grading to gravel on the slopes up to the old beach line.

The land now submerged by Salton Sea contains over 3 per cent of alkali. The central portion of the valley from Thermal to the sea and mainly southwest of the railroad contains from 1 to 3 per cent of alkali. A neck of this area also extends up the arroyo from Thermal to Indio on the northeast side of the railroad. The remainder of the valley has less than 1 per cent of alkali, the sandy soil near the old beach line and the dune sand around Point Happy having less than .20 per cent. The area with over 1 per cent of alkali is enclosed on the accompanying map by a dashed line. The land in its natural state supports characteristic growth of the Colorado Desert, salt weed in the lower areas, mesquite along the washes or on the hummocks in soft soil and an occasional palo verde.

The lands were classified as agricultural and nonagricultural by the United States Department of Agriculture in cooperation with the Conservation Commission of California in 1912. The agricultural land is summarized as follows:

	Agricultural land, acres
Coachella Valley, below Point Happy	135,680
Coachella Valley, above Point Happy	7,680
Palm Springs	7,680
Desert at Seven Palms	9,000
Desert below Mission Canyon	4,480
Morongo Valley	5,120
Eastern slope of San Gorgonio Pass	26,680
Total	196,320

Land Ownership.

Settlement in Coachella Valley was subsequent to the building through of the Southern Pacific railroad in 1879 and the railroad company acquired by grant each alternate section of land throughout the valley, in aggregate nearly half the area. The public land of value below Point Happy has all been filed on under the homestead and desert land acts and most has been patented. The railroad lands were placed on the market a few years ago and over 75 per cent of them below Point Happy have been sold, while those on the desert above are mainly unsold.

At present settlement is extending to the government lands along the wash above Point Happy, where there are numerous pending land entries. Wells are also being bored at Seven Palms, where the topography is favorable to light pumping lifts, and in Morongo Valley. Promoters have in late years colonized lands at Cabazon in San Gorgonio Pass, while a project at the mouth of Palm Canyon failed to materialize. The Banning Water Company was organized in 1884.

The agricultural development in lower Coachella Valley, which began actively about 1900 along the railroad, has been steady, and recent development has extended to the slopes on the southwest side of the valley, where much of the good soil is located. The photograph (Pl. V, Fig. 1) is of the Travis pumping plant at the coral reef. A description of this plant illustrates the character of the larger developments in this region. The well is 12 inches in diameter, 745 feet deep and water stands at 31 feet from the ground surface. The pump is an eight-inch centrifugal and the power a 60-horsepower gasoline engine. The discharge of the pump is given at over five second-feet. The plant is for the irrigation of 320 acres.

The Cabazon, Augustin and the greater portion of the Torros Indian reservations are in lower Coachella Valley and the Agua Caliente is at Palm Springs. Morongo, Mission Creek and Santa Rosa reservations are wholly or partially within the drainage basin. Some of the Indian lands are now inundated by Salton Sea.

The unimproved lands of the railroad company are selling at $35 to $110 per acre. Improved land in the valley is held at $50 to $150 per acre and some planted to date or citrus orchard is held $300 to $600 per acre or higher, in the case of producing date palms on the proper kind of soil.

Crops.

The principal crops in Coachella Valley are alfalfa, wheat, barley, cotton, beans, onions, cantaloupes, grapes, citrus fruits and dates. The places where the date industry gives promise are limited to a few localities with peculiar conditions in the extreme southwest, and none fill the requirements better. The date palm withstands alkali to a high degree and some orchards are growing on the moist salty lowlands but these do not produce as good quality of dates as the soft sandy soils which take more warmth. The warm soil, together with the long hot season of low humidity, give high percentage of sugar to the fruit and mature such delicate but preferred varieties as the Deglet Noor. The Bureau of Plant Industry of the United States Department of Agriculture conducts an experimental date farm near Indio. The date industry is important as a highly specialized crop with good prospects for profitable extension rather than for large area now devoted to culture, although it is estimated that about 800 acres have been planted to palms.

Climate.

The pronounced features of climate of Coachella Valley are extreme heat in summer, great length of hot season, dry atmosphere, strong winds during late winter or spring, wide range of temperature between noon and midnight, mild winters, low and erratic precipitation, all desert characteristics. The following are the mean maximum and mean minimum monthly temperatures in degrees Fahrenheit at Indio for a period of 14 years prior to 1909:

Month	Mean monthly maximum	Mean monthly minimum
January	67.0	39.7
February	72.9	43.9
March	79.2	51.0
April	87.6	58.2
May	92.5	63.7
June	101.4	71.0
July	107.1	78.8
August	105.3	77.0
September	100.8	70.0
October	90.3	57.8
November	79.5	47.2
December	69.6	38.4
Annual	87.8	58.1

The highest temperature recorded in the full 34-year period for which measurements were made was 125 degrees in July, and the lowest 16 degrees in January.

Area Irrigated.

A canvass of the irrigated land was made by the United States Department of Agriculture in cooperation with the Census Bureau in 1909, and the irrigated tracts as then determined are shown by hatching on the accompanying map. Some of the irrigated land in the valley was overlooked in that canvass, and additions have been made since 1909 so that the map shows only a part of the lands irrigated at present. The area irrigated below Point Happy as shown by the map is 3,800 acres, whereas it is estimated that 6,000 acres are being irrigated in 1916.

The area irrigated in the entire drainage basin of Coachella Valley is summarized as follows:

Irrigated area	Acres
Coachella Valley below Point Happy	6,000
Coachella Valley above Point Happy	160
Palm Springs	300
Seven Palms	80
Mission Creek Indian Reservation	160
Morongo Valley	160
Whitewater	160
Cabazon	320
Morongo Indian Reservation	1,300
Banning	2,700
Total	11,340

Duty of Water.

But few data on use of water in Coachella Valley are available, but the duty is probably a little higher than in Imperial Valley, where soil, climate and crops are much the same, and where about three acre-feet per acre is used per annum for the entire area. Making allowance for a somewhat more economical use at Coachella on account of most of the water being pumped, than in Imperial, where it is from canals, the duty is estimated at two and one-half acre-feet per acre. The duty of water at Banning, where orchards are irrigated, is found on the basis of the use of 11 second-feet for seven months on 2,700 acres to be 1.7 acre-feet per acre. Assuming a duty of two and a half acre-feet per acre for the total area of 11,340 acres irrigated in the drainage basin, 28,350 acre-feet are used annually from Whitewater River and tributaries.

The ratio of area irrigated to the area of watershed is very low. Considering only the San Bernardino and San Jacinto mountain portions of the drainage, 11,340 acres are irrigated from 523 square miles of watershed. On San Antonio Creek 20,000 acres at Pomona, Claremont, Upland and Ontario are irrigated from a watershed in San Gabriel Mountains of 36 square miles. The two watersheds compare favorably as to elevation, but differ as to rainfall. On San Antonio Creek all surface discharge is used in the irrigating season, the distribution being entirely by underground pipe. The underground water is pumped from over 100 wells and winter flood waters are spread over the gravels to replenish the underground basins so that practically no water escapes.

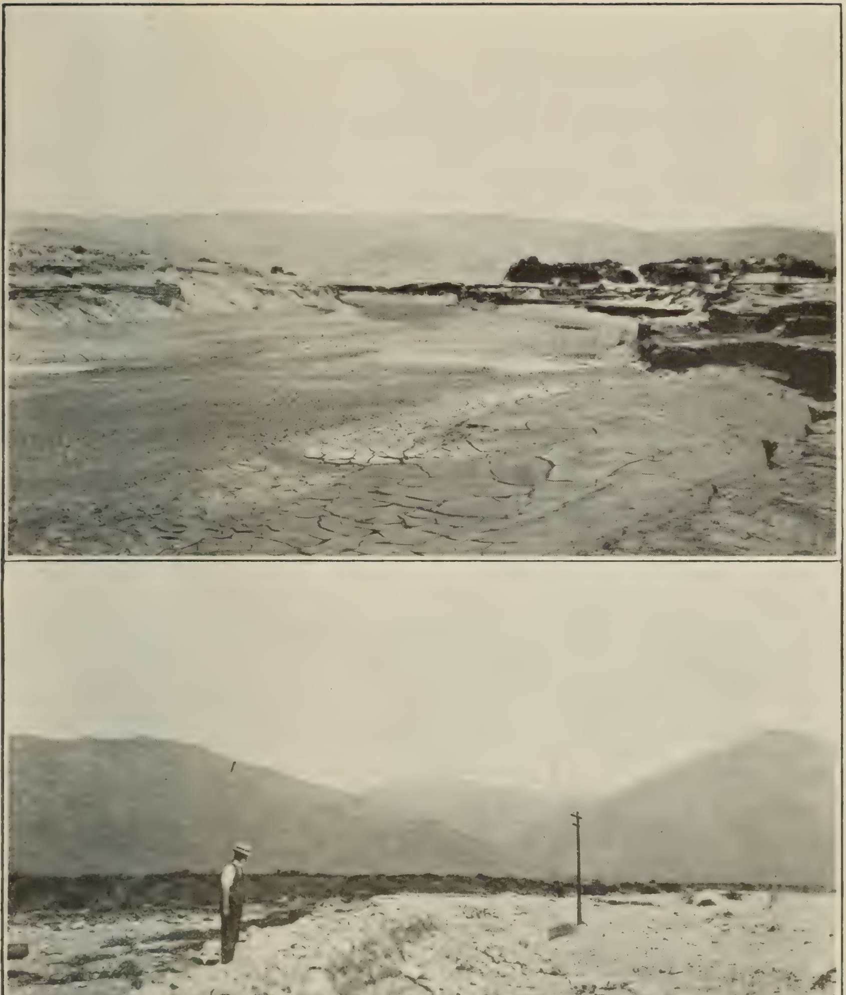


Plate VI, Fig. 1 (upper).—Channel eroded and enlarged by flood of January, 1916, along the location of levee constructed by Indio Levee District. Fig. 2 (lower).—Rock levee on San Antonio Creek. The drift on the face of the levee shows height at which flood water stood.

Conditions are unfavorable for such an efficient use of water from Whitewater River. The stream discharge varies much throughout the year, storage sites are not available, the valley lands are distant from the canyon, piping the water across the desert would be expensive, the evaporation is high, and it is impossible to recover from wells all the water that sinks.

Water Rights.

Water rights are based on appropriation and use while some of the irrigated land in San Gorgonio Pass and at Palm Springs is riparian. Most of the appropriations have ripened into prescriptive rights. So far as is known the courts have not been called upon to decide any water right questions on Whitewater River or as between well owners in Coachella Valley. The valley irrigators opposed the diversion from the Whitewater to Banning by the Consolidated Reservoir and Power Company a few years ago by objecting to the company being given rights of way through the national forests, but the permits were granted and the question of water rights did not reach the courts. In this case the water is not carried outside of the general drainage basin, but its use at Banning must, to a slight extent, lessen the amount reaching Coachella Valley. It is understood that the proposed Pluth power projects for Whitewater Canyon contemplate the return to the stream of any water used.

Waste of Water From Flowing Wells.

Wells in the artesian area near Salton Sea are in some cases allowed to flow when the water is not being used. This practice should be condemned. The law of California requires that flowing wells be capped when not in use. The convenience of the individual must be subjected to the rights of the public and the conservation of the valley's water supply. To equip wells with valves and to close them when the water is not being used is not a burden on well owners, except in some cases where damage to the wells would result. The well and the land may be private property, but the water is the property of the state.

Storm Water Problems.

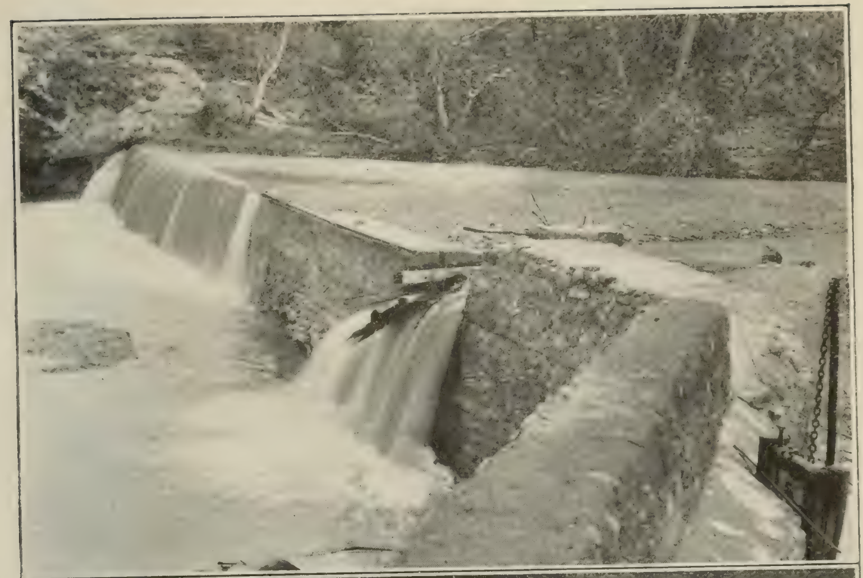
Whitewater River, after leaving its canyon, is joined by San Gorgonio River. The stream, after crossing the steep slope of its debris cone, is joined by Tahquiz Creek. It is only in times of flood that any water flows on the surface below this junction, but at such times the confluent waters seek the lowest side of the valley, which is above Point Happy, on the southwest side. But near the point the slope changes, and below the point the transverse slope, or that at right angles to the main slope of the valley, is toward the northeast side. The floor of the valley and desert may be likened unto a warped surface, in which the twist occurs at Point Happy. The main water channel then crosses to the other side of the valley where this change in slope occurs, and in crossing over it is aided by the deflecting force of the point. The channel is not so well defined through the lower valley, and there appears to be two channels along which flood water passes to Salton Sea. One of these follows along the center of the valley, while the other, which is the more pronounced, follows along the lowest level, and after crossing the railroad above Indio leads along the northeast side of the track past Coachella, but recrosses the track at Thermal, and finally terminates in Salton basin.

The first organized effort to control floods was by the Indio Levee District, which embraced only T. 5 S., R. 7 E. This district planned to conduct all the flood water north of and around Indio to the lower channel northeast of the railroad and for this purpose began the construction of a ditch and levee about four miles in length. The location of the levee is shown on the map. The first mile at the upper end of the ditch and levee had been constructed when the flood of this year came.

Flood of 1916.

The flood of January 17, 1916, which is believed to represent the maximum rate of discharge for Whitewater River, came very suddenly. It is noted from the tables of precipitation given herewith that the rainfall for the two days, January 16th and 17th, was, at Seven Oaks 11.70, Beaumont 4.28, and Cabazon 4.40 inches, also that the total rainfall for the 15 days preceding these dates was, at Seven Oaks 5.62, Beaumont 3.53, and Cabazon 0.20 inches. Rains also occurred in the preceding December. The mountain slopes were probably already fairly well saturated at the time of the high precipitation at the middle of January and the two days storm produced a rapid run-off from the steep and rather thinly-timbered watersheds. The travel of the storm, west to east, being the same as the direction of the stream flow, tends to large accumulation of water and sudden discharge.

Whitewater and San Gorgonio rivers, Millard, Snow and Tahquiz creeks and Deep Canyon gave high discharge. The high water reached to Palm Springs in the forenoon of January 17th, and receded towards evening. The flood eroded a large channel, shown by Pl. VI, Fig. 1, across the valley along the Indio levee and overflowed, doing much damage to towns, farms and roads. The county highway was also damaged at many points all the way from Banning to Indio. It will be noted from the map that this road follows near the stream channel almost throughout this distance. Damage also occurred to farm property in the upper valley and at Palm Springs and the Rogers Ditch was



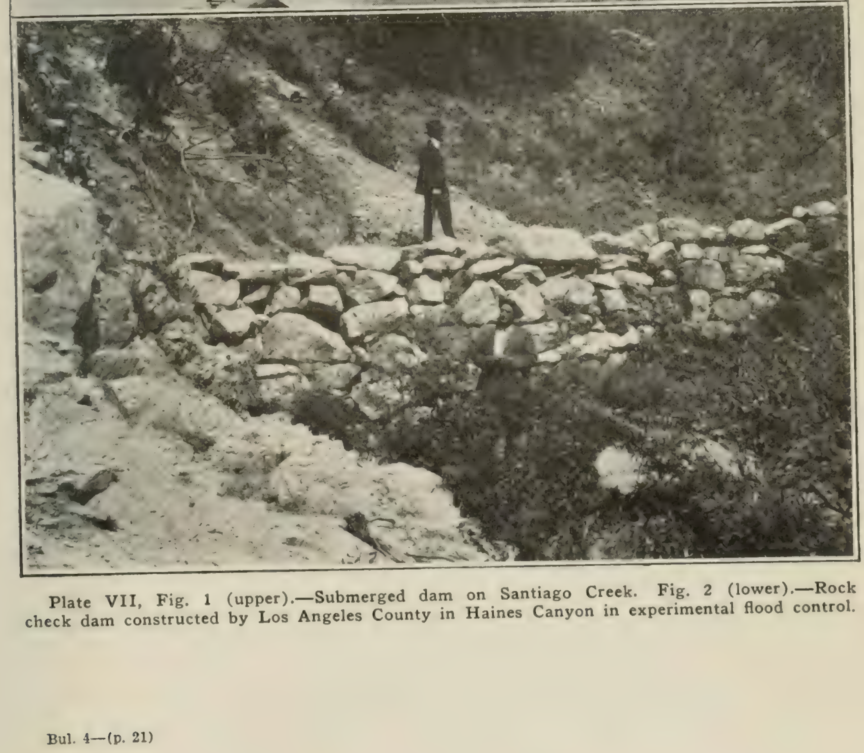


Plate VII, Fig. 1 (upper).—Submerged dam on Santiago Creek. Fig. 2 (lower).—Rock check dam constructed by Los Angeles County in Haines Canyon in experimental flood control.

filled with sand for several miles. The Southern Pacific Company suffered damage to track at the numerous stream crossings between Banning and Palm Springs Station and again from Indio to Thermal.

Coachella Valley Storm Water District.

The plans of the Indio Levee District, had they been carried out, might have safeguarded property at Indio, but they made no provision for protection of lower lands and the Coachella Storm Water District was organized for the lower portion of the valley. It then became apparent that the problem must be solved with respect to the best interests of the entire valley and the Coachella Valley Storm Water District was organized under the law of California, absorbing the two smaller districts and embracing all valley land from Whitewater to Salton Sea. The boundary of the district is shown on the accompanying map in heavy solid line. The district has an area of 169,600 acres, of which about 80,000 acres are non-agricultural. It includes about 28,000 acres of Indian lands on the Agua Caliente, Cabazon, Augustin and Torros reservations and about 30,000 acres of unsold railroad land, of which about 18,000 acres are on the desert above Point Happy.

In a review of methods of disposing of flood water, the following may be considered: Storage in reservoirs; check dams to retard the flow; spreading surplus waters over gravel beds; channel to carry flood water, and levees to protect the lands from overflow. The problem, however, should not be confined merely to the disposal of flood water, but should also take into account the conservation of the water supply and irrigation resources.

Storage in Reservoirs.

No systematic search for reservoir sites in the watersheds of Coachella Valley drainage has been made, but examination of the topographic map fails to disclose any promising locations for dams. The engineers for power companies report that no storage sites were found in the Whitewater watershed. Aside from the question of sites it would be very expensive to conduct stored water from mountain reservoirs across the desert to the agricultural lands.

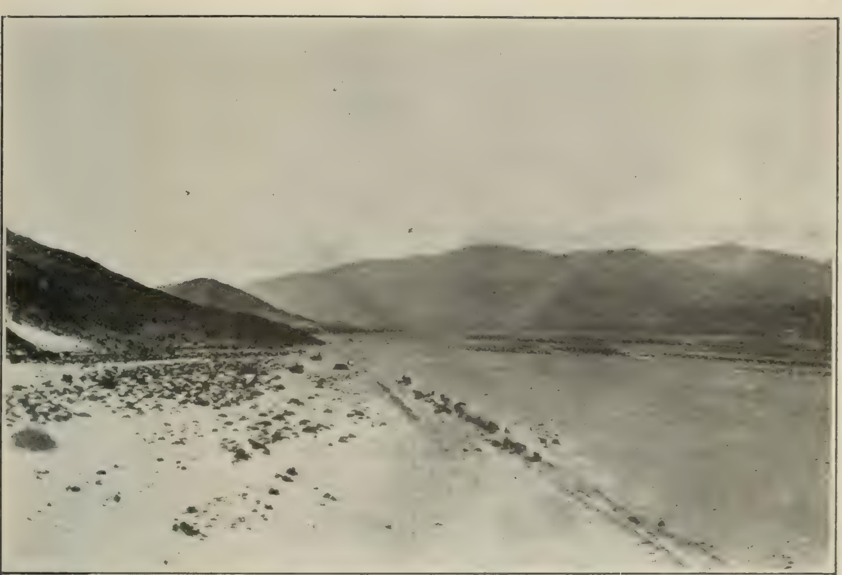
Check Dams.

Check dams are used in Switzerland, Austria, France and Japan to control floods and to prevent erosion on mountain streams with steep grade, and Los Angeles County is now experimenting with them in Haines Canyon as a means of flood control. Private parties have also constructed small check dams in Ward Canyon, a small stream near Los Angeles, for the protection of an estate. The dams, after being in use two years, show that they have been very effective in causing the water to be absorbed in the canyons, in prolonging the period of discharge, and in destroying the force of the flood water within the mountain watersheds, and the experiments justify trials of check dams on larger streams with similar conditions. Haines Canyon, according to the report of the Board of Engineers on Flood Control of Los Angeles County, has a catchment area of six and one-half square miles and the discharge in February, 1914, was 712 second-feet per square mile of drainage, being the highest rate of run-off per unit of area of any stream in the county. This exceptional rate is accounted for by all brush in the watershed being burned September, 1913. Check dams to the number of 384 have already been constructed at a cost of $6,000, or $15.62 each. The cost of the dams varied from $5 to $500. An examination of the check dams was made in March, 1916, after the heavy floods of the winter. Pl. VII, Fig. 2 and Pl. VIII, Fig. 2 show two types of dams constructed in Haines Canyon.

A noticeable effect of the dams has been to stimulate the growth of brush, which is proof that the soils along the channels have absorbed more moisture than before the construction of the dams. While it may be reasoned that the method which has been successful in these small canyons can be applied on larger streams by building more and larger dams, it is not considered a practical and economical solution of the Whitewater flood problem. The steep, rocky and barren slopes of the higher mountains would not absorb much water if it were checked and the cost of building a sufficient number of such dams over the large watershed could not be borne by Coachella Valley.

Conservation of Flood Water.

Excellent opportunity is given to spread storm water below Whitewater Canyon for the betterment of Coachella Valley's underground water supply. Such work, besides being a conservation measure, should prevent the smaller floods reaching below Point Happy and should materially lessen the larger floods to be taken care of in the lower valley. In proceeding to consider this method of disposal, it is well to determine the size of the floods and to review what has been accomplished on other streams in southern California. The best place to gage the size of the stream is at Point Happy, for it will be noted from the map that all water is here collected into a single channel and that it is again diffused below the point. The channel near this point is also more confined than on any other part of the stream. The water line of the flood of January 17, 1916, is still apparent on the bank and until a survey of the channel can be made an estimate from observation is offered as follows: Width, 150 feet; greatest depth 15 feet; grade, as



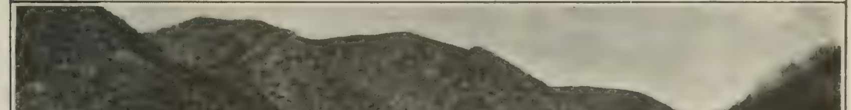


Plate VIII, Fig. 1 (upper).—Head of Coachella Desert where water may be spread over gravels.
Fig. 2 (lower).—Check dams built by Los Angeles County in Haines Canyon.

shown by topographic map, 19 feet per mile; character of channel, silt; discharge from Kutter's formula, approximately 9,000 second-feet. As it is possible that the channel erodes at high flood and silts up on a declining stage, it is estimated that the maximum discharge is 10,000 second-feet.

The flow from Whitewater Canyon was probably greater. The river is augmented between the crossing of the railroad and Point Happy by San Gorgonio River, Snow Creek, Tahquiz Creek, Palm Canyon and Deep Canyon, but on the other hand there is loss by absorption in that distance. The point of largest flow is probably just below either the junctions of San Gorgonio River or Tahquiz Creek.

Probably the earliest attempt to store water in the soil by artificial methods for the betterment of an irrigation or water system was work done in Colorado by the Denver Union Water Company over 20 years ago, to increase the flow of a tunnel in Cherry Creek. In Utah, water has been run onto hillside lands, to saturate them in winter, so that the seepage might moisten lower valley lands to the benefit of crops growing there in summer. In southern California the practice of spreading water to increase the output of wells was begun on a small scale on Santiago Creek in Orange County in 1896 and on larger scale on Santa Ana River and San Antonio Creek about 16 years ago. Similar operations have been conducted on Lytle Creek, San Jacinto River, San Dimas Creek, San Gabriel River and San Gorgonio River.

Spreading Water on Santa Ana River.

On Santa Ana River, water is spread over the gravel cone below the canyon between Redlands and Highlands where the slope is from 200 to 50 feet per mile, and in nine reservoirs three to four feet deep and covering about two acres each. The water is diverted from the stream by three permanent main ditches on grades approaching the contours from which it is divided and subdivided and finally allowed to flow from the smallest ditches over the gravelly soil where it is absorbed. The headworks are concrete structures and they are sometimes washed out by the high water and they require frequent repairs while the ditches must receive constant attention while the work is in progress. The work was first done by the Riverside Water Company and the Gage Canal Company of Riverside, but is now conducted by the Water Conservation Association incorporated with membership from three counties representing all of the irrigation interests on the Santa Ana.

It has not been possible to spread the maximum floods and has not been considered desirable to divert water until after the highest water with its detritus has passed as it is believed use at the high stage would silt up ditches and leave the spreading ground less pervious. The spreading begins two or three days after the peaks of the floods. The association filed claim to 500 second-feet of flood water and the government has withdrawn from entry some of the land in Santa Ana wash for the use of the association, on account of the more general usefulness of the land for spreading than for agricultural purposes. The association owns other lands, giving a total of 2,640 acres for use.

Charles H. Lee, who has made a study of the value of the work on the Santa Ana, states, in the report of the California Conservation Commission for 1912, that the association spread in one year an average of 75 second-feet for 100 days or about 15,000 acre-feet of water at an operating cost of ten cents per acre-foot and a total cost, including interest, of 14 cents per acre-foot. The cost to the association for three years was: Works, $4,371.66; real estate, $2,853; tools, $163.83; operating expenses, $3,619.45, or about $1,200 per year.

The capacity of the system is 250 second-feet. The work requires four men. Mr. Lee, after an investigation of the wells of the San Bernardino basin, concluded that water spreading on an extensive scale had not been conducted long enough to have great effect on the underground water plane and that the rise of the ground water was due primarily to seasons of heavy rainfall but that the water spreading was a commercially practical work of great public benefit.

Francis Cuttle, president of the association, states that the amount of water spread for four years was as follows: 1912, 11,710 acre-feet; 1913, 1,541 acre-feet; 1914, 17,956 acre-feet, and 1915, 13,317 acre-feet. The rate of absorption was 3.22 second-feet per acre for the land and 20 second-feet for the nine reservoirs with aggregate area of 18 acres.

Pl. II, Fig. 2 shows Santa Ana River, at the mouth of the canyon and the head of the gravel cone. Pl. IX, Fig. 1 shows the accumulation of drift after the flood of 1916 had subsided.

Spreading Water on San Antonio Creek.

San Antonio Creek is a smaller stream and water spreading has not been on so large a scale as on Santa Ana River, but the methods have been similar. The mouth of San Antonio Canyon is shown by Pl. X, Fig 2. Proof as to the value of spreading water is perhaps more conclusive on San Antonio Creek than on the Santa Ana. The water is spread over the boulders, gravel and soil below the canyon with slope of 200 to 100 feet per mile. An association has been organized among the water companies and individual well owners, of which there are many in Pomona Valley, to conduct the work, and the cost is borne by the members in the proportion that water is used by them. At first the headworks were of a temporary kind and much work had to be done when the floods came to divert the water. Three main ditches are used. Later

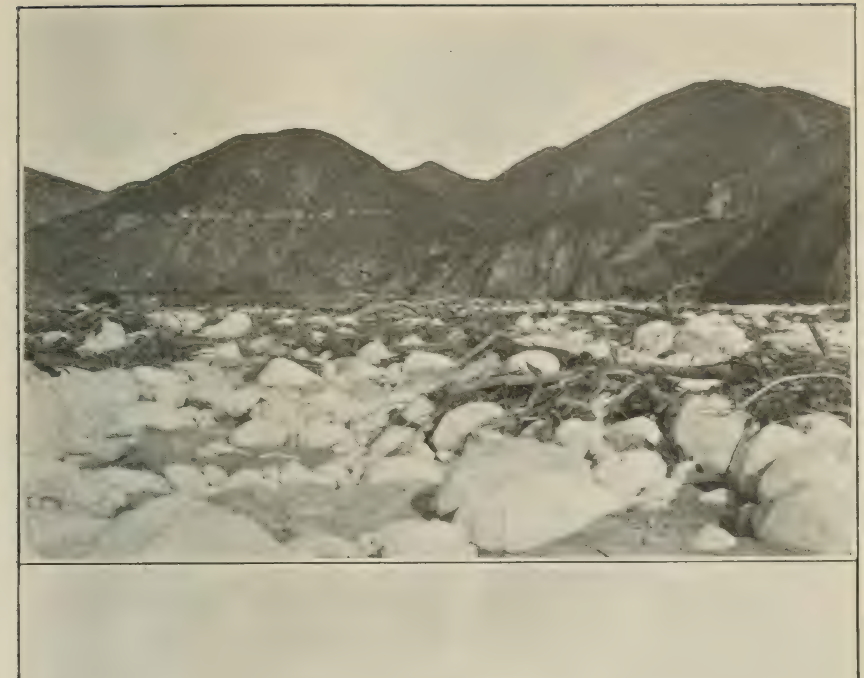


Plate IX, Fig. 1 (upper).—Drift left below Santa Ana Canyon by flood of January, 1916. The diversions of the Water Conservation Association are made just below this point. Fig. 2 (lower).—Division and control gate on ditch for spreading water on San Antonio Creek. The view shows the general character of the spreading ground.

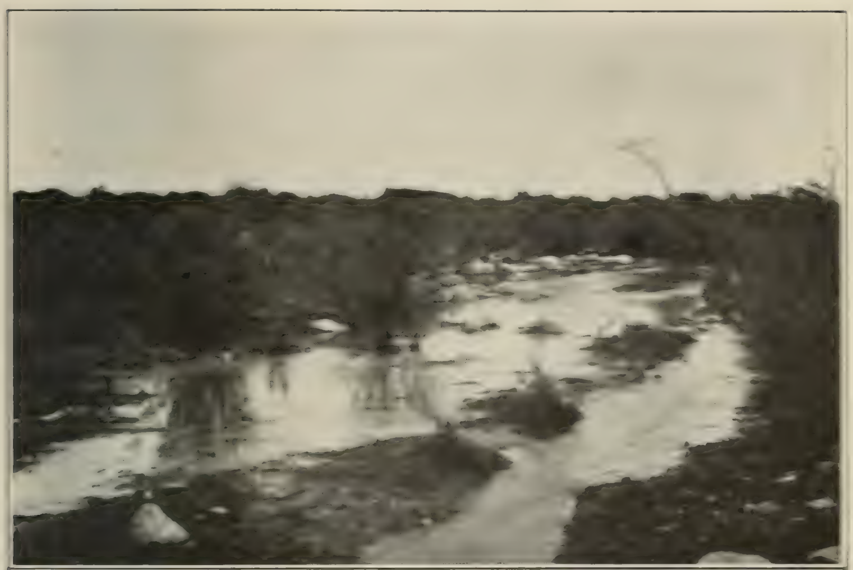


Plate X. Fig. 1 (upper).—Diffusing flood water from San Antonio Creek over porous soil for underground storage by absorption. Fig. 2 (lower).—Mouth of San Antonio Canyon.

concrete headgates were placed on these and a concrete dam was placed across the stream channel at the upper gate. This dam is shown by Pl. XI, Fig. 2 after being damaged by the floods of 1916. Pl. XII, Fig. 1 shows the headgate at the same point. Pl. IX, Fig. 2 shows a division and control gate on one of the ditches and the general character of the spreading ground. A stream of about 30 second-feet is diverted at the upper headgate and less at the lower gates. Streams of 20 or 30 miner's inches are taken from the main ditches and the water is induced to cover as much ground surface as possible. The grades and alignments of the ditches conform to the topography of the land and the more checks to form pools the better for absorption. The association owns most of the land on which it operates. Pl. X, Fig. 1 shows the water flowing over the land on San Antonio Creek. Willis S. Jones, engineer for the association, states that the soil takes up 100 miner's inches or two second-feet per acre continuously during the several weeks of the flood season. A test made by Mr. Jones and the writer shows that the rate of absorption sometimes reaches double that figure. Two men are employed throughout the season and an additional force on occasions. The cost of operation has been 30 cents per acre-foot. The effect of spreading water has been very marked on a tunnel and wells a few miles below the spreading ground. The flow of these increases in the late summer. The effect of the work reaches wells lower in the valley the second year. Except in years of unusual run-off no water is allowed to flow beyond the limits of Pomona Valley.

Spreading Water on Santiago Creek.

The work on Santiago Creek is conducted jointly by the Serrano and Carpenter mutual water companies of Orange County. These companies, one on either side of the stream, secure water from a submerged dam in the canyon and to better their irrigation systems the water must be spread above the dam. Suitable lands for this purpose are found in expanses of the canyon. Systematic spreading of water was begun in 1910 and is now being done on three tracts of land, a total of 400 acres. A maximum of about 100 second-feet of water has been used and the season of work covers three to five months in the winter and spring. The area of spreading is being gradually extended and from $1,500 to $2,000 is being spent annually on ditches, levees and gates. The cost of operation is the wages of one man at $2.50 per day for the season, and wages of two additional men for one month. The method of working on Santiago Creek has differed from that on Santa Ana River and San Antonio Creek. The water is carried in ditches to the spreading ground which is prepared by building levees three feet high on contours 200 to 300 feet apart, depending on the slope. The ends of the levees are turned up the slope slightly to partially basin the water.

The supply stream is led above the upper levee and the water flows around the ends of the levees to lower compartments, its course being directed somewhat by short levees at the ends of the contour levees.

Spreading Water on Lytle Creek.

Flood water is used on Lytle Creek by the Fontana Water Company, of Rialto, and the water must be stored in the canyon to benefit the company's irrigation ditch, which diverts from the mouth of the canyon. The space for spreading in the canyon is so limited that the usual method can not be followed. The method here has been to run water into wells or shafts excavated to depths of about 50 feet. The surface exposed to water in a number of these sumps is sufficient to make the work effective.

Need of Spreading Floods on Whitewater River.

It will not be possible to ingulf all of the larger floods on the debris fans of Whitewater and San Gorgonio rivers and Tahquiz Creek. The work need not be limited by the area as on some other streams, for there is available 9,000 acres between Whitewater River and Mission wash, the 1,200-foot contour and the Southern Pacific railroad, and half the area or 5,000 acres between the railroad and the Rogers Ditch, also half the area or 1,000 acres below Tahquiz Canyon. At the rate of absorption for San Antonio Creek two second-feet per acre continuously, these areas should take up 30,000 second-feet, provided so much water could be handled. Only half of the gravel areas below the railroad are considered, because in flood stage the stream naturally spreads over much of this land.

The work on the Whitewater would of necessity differ in some respects from that on streams in the coast drainage. Nothing is to be gained from either the standpoint of conservation or flood control by spreading water except when the stream would, if uncontrolled, flow below Point Happy. This occurs so few days in each year that the period of diversion would be very short as compared to other streams in California. For the work to be effective during the short high flood periods, a much larger quantity of water must be diverted than has been handled on the other streams. The distributing system of ditches must then be more extensive and costly than those near the coast and a larger force of men must be employed to control the works during these short periods of operation. The infrequent floods in this arid region of erratic precipitation rise so suddenly that a force of men to attend the works would have to be assembled for the flood season each year and a camp maintained at a convenient point. The length of channel above the railroad from which diversions can be made is more limited than the area for spreading above the track.

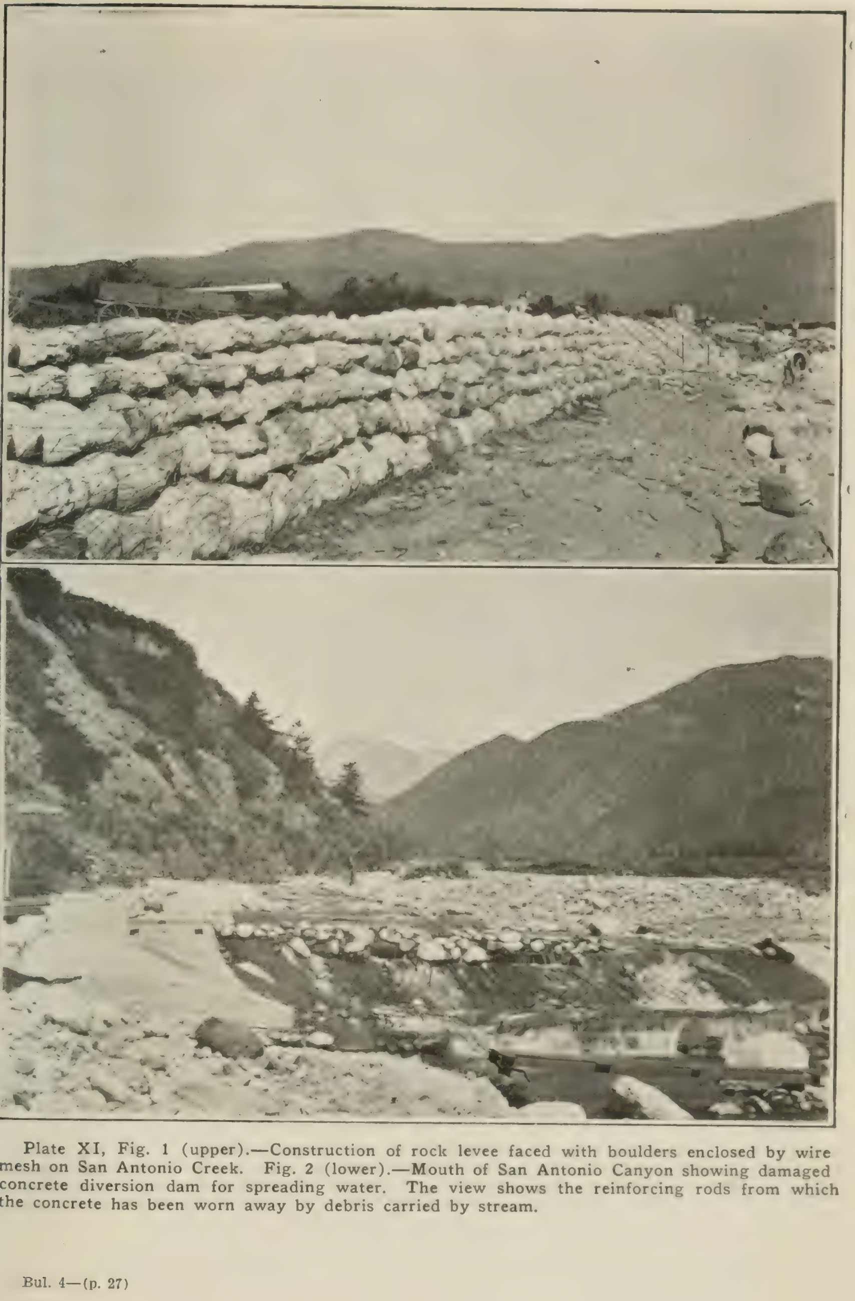


Plate XI, Fig. 1 (upper).—Construction of rock levee faced with boulders enclosed by wire mesh on San Antonio Creek. Fig. 2 (lower).—Mouth of San Antonio Canyon showing damaged concrete diversion dam for spreading water. The view shows the reinforcing rods from which the concrete has been worn away by debris carried by stream.

This case seems to require one of two plans, either massive permanent headworks for taking water out at one or two points, or numerous somewhat temporary dams and headgates, which would require frequent repairs. Unless concrete structures can be made heavy enough to stand the high water, the dams may as well be constructed of boulders, wire and sand bags, to be repaired, sustained or strengthened while the flood is in progress. The weakest point in such a system should be at the head-works rather than in main ditches, for if the latter break, the water would probably damage the railroad at points where bridges are not provided to pass it under the track. Breaks in lateral ditches can be controlled. As it would not serve the purpose of the work to wait until the peaks of the floods have passed, the silt-laden waters would have to be used at risk of detriment to the porosity of the land. The particles of silt, when dry, would be swept by the winds down to the dune lands and the spreading ground left clean for the next season. The action of the wind on this part of the desert is understood when it is known that sand carried by it wears the telephone poles in twain unless they are protected by stubs driven on the west side.

If 2,000 second-feet, or about ten times the maximum rate of use on Santa Ana River be spread for 15 days each year, the total volume is 60,000 acre-feet, a very large addition to the underground water and sufficient for the irrigation of 24,000 acres of land, provided all of it could be recovered. The cost per annum would be $8,400 at 15 cents per acre-foot, the rate on the Santa Ana, including interest; or $18,000 at 30 cents per acre-foot, the rate on San Antonio Creek without interest. Unless 2,000 second-feet can be used, the work will not have much effect on the larger floods.

The mouth of Whitewater Canyon is shown by Pl. II, Fig. 1 as it appeared April 3, 1916. The detritus of boulders will be noted. The suggested locations for ditches for spreading water are indicated by heavy dotted lines on the accompanying map, Pl. I. These correspond to the map contours, but are not located from special surveys.

Ditches for diffusing water need not be true in grade or alignment. They may humor the topography, and the more checks the better. A lower embankment only is necessary. Pl. XI, Fig. 1 and Pl. VI, Fig. 2 show rock levees along San Antonio Creek to control the channel in connection with water spreading. This type of construction is adapted to locations where the rock is at hand. The water face of the levee is protected by a mattress of boulders enclosed by wire mesh tied throughout to prevent the stone accumulating at the bottom and anchored at the top and base. The levee is further protected by stringing sacks of boulders tied sausage-like and anchored at one end only. The design of the levee is shown by the accompanying sketch. A length of 8,000 feet of this levee was built for $2,000.

Need of Flood Water Channel.

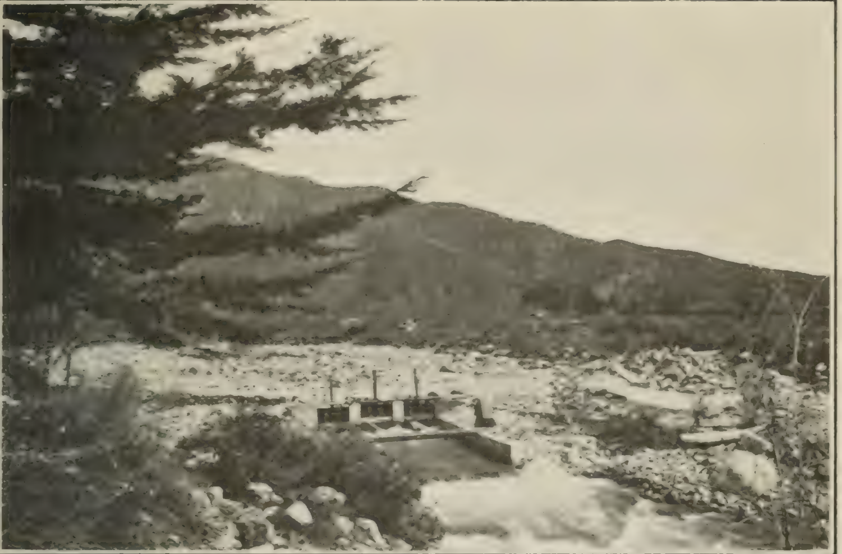
As it is hardly possible to prevent all flood water reaching lower Coachella Valley, a channel to confine and direct the surplus water should be located and improved below Point Happy. Even should the upper tributaries be controlled, it is probable that Deep Canyon would at times discharge enough water to reach Salton Sea. Conditions are not so favorable to spreading water at the mouth of this canyon for the stream discharges on the more pervious silt floor of the cienega with its moist subsoil at Indian Wells. The problem now before the Coachella Valley Storm Water District is one in which conservation of the water supply, flood control, best use of water in irrigation, improvement of the highway, and drainage of saturated low lands are interrelated.

The location of the Riverside County highway depends on the route selected for the flood channel. The highway is now being cut through the rock at Point Happy. At present the main road leads to Indio and through the other towns along the railroad. The county is waiting for the storm channel to be located before determining the route of the new road through the valley. The bonds for the road from Banning to the Imperial County line, amounting to $275,000, have been sold and interest is being paid on them. The accompanying map, Pl. I, shows, outlined by dashed line, an area of 27,300 acres with one to three per cent of alkali. Some of this land is being farmed, but much of it would be improved by drainage. A channel running through it may be made a step towards a more comprehensive drainage system, and should be a direct benefit to the land by removing some of the salt. If water be not conserved on the gravel cones the outlook for a large extension in the irrigated area is not good. There is yet plenty of good land on which to use the water now available; however, the most economical pumping is in the low area, and in case of overdevelopment of the underground water the wells in the low area would be affected last, so it is probable that the low lands, except where the salt content is excessive, will always be farmed.

Location of Flood Channel.

Two routes for a flood channel are worthy of consideration. One would be to continue the plan begun by the Indio Levee District by conducting the water north of Indio to the main natural channel through the valley northeast of Coachella and crossing the railroad at Thermal. The other would be to hold the water to the southwest side of the valley below Point Happy, allowing it to enter one of the natural channels in the middle of the valley, towards Salton Sea.

The advantages of the first-mentioned route are that it follows the lowest depression of the valley, and a natural, if inadequate, channel to which most unconfined water gravitates; that it should be easier to



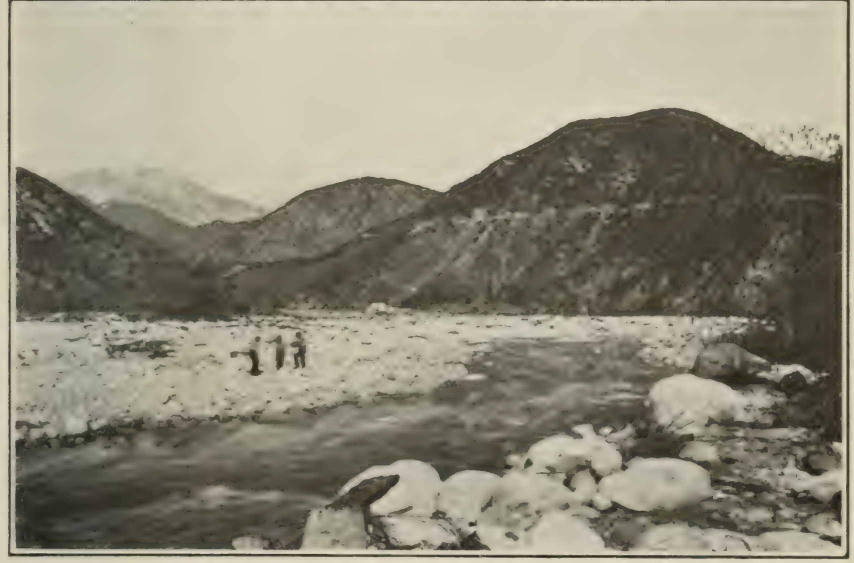


Plate XII, Fig. 1 (upper).—Headgate below San Antonio Canyon near Claremont for water conservation work of Pomona Valley Association. Fig. 2 (lower).—Head of gravel cone at mouth of Santa Ana Canyon January 22, 1916. Powerhouse is shown in distance.

maintain than a channel on higher ground, and that it is well located to act as a drain for the improvement of the alkali lands. The disadvantages are that it is close to the towns of Indio, Coachella and Thermal, and to well improved lands, especially above Indio, that it crosses the railroad twice, and that it is not the most direct route.

The advantages of the last-mentioned route are that it is more direct than by way of Indio and that it avoids proximity to the towns and the railroad. The disadvantages are that it would be more difficult to maintain than the lower route, that it passes through some of the best land in the valley, and that it would, through seepage, aggravate rather than improve the condition of moist low land. There is little choice between the two routes on account of length. The distance from Point Happy to Salton Sea along the southwest side is about 20 miles, and by way of Indio and the arroyo 23 miles.

The several divisions of grade for Whitewater River are as follows:

	Fall, feet	Distance, miles	Grade, feet per mile
Source to mouth of canyon	10,085	20	504.0
Canyon to Palm Springs	950	10	95.0
Palm Springs to Point Happy	870	16	54.4
Point Happy to Salton Sea via Indio	317	23	13.8
Point Happy to Salton Sea via southwest	317	20	15.8

The map shows the grade from the 100-foot contour at Indian Wells to sea level to be: along the Indio levee 17.5 feet per mile, and along southwest side 16.7 feet per mile. The grade of either route is sufficient, and there seems to be no serious abrupt changes in grade in either. There need be no short curves on either route. The long bends on the Indio route should not cause trouble.

In either channel the action of a high-water stage would be to erode and of a declining stage to deposit silt. Drain ditches have been constructed on the east side of Imperial Valley, where the soil and grade are similar, by building two small levees to confine the water and by sluicing a channel between them. A high velocity is desirable if the channel is to be in the main cut below the ground surface, but a moderate velocity is better if the current must act against levee built above the ground surface. The cost of construction should not be much different for the two routes, for while the Indio route is longer it should, being on low ground, not require so high a levee as the other route. The advantage would depend largely on whether one route would require more double levee than the other. A levee on one side only may be sufficient for portions if not all of either route. For the benefit of the moist land the Indio route is much the better. This route should, other things being equal, be more easily maintained. In case of accidental break in the levee the water would be apt to do damage to the towns and to the railroad. In case of similar accident on the other route it is uncertain what direction the water would take, but it is probable that it would flow eastward and reach towns below Indio. It is probable that the Southern Pacific Company would, for the protection of its operating property, favor the route on the southwest as the railroad would have to bridge the channel past Indio twice. If the water be properly controlled the railroad should not be menaced with one route more than the other. The railroad company has much land in addition to its right of way and its interests are in common with those of the entire valley. The best engineering plan should be followed and adjustments made by properly distributing the costs. The land that would be required for right of way for a drain on the southwest side is better agricultural soil than that along the railroad, but the value of the latter may be influenced by proximity to towns. The flood channel can be more cheaply improved by constructing levees with plenty of space between than by excavating a deeper channel between levees closer together to give the same capacity. While the route along the railroad seems the more favorable, final recommendations can not be made until preliminary surveys are made and more information gathered on the two routes. From an engineering standpoint the water spreading on the gravels should be begun first and then the storm drain to control the surplus could be more intelligently designed, but since the problem is complicated by the location of the highway, the directors of the district may decide to construct the drain first.

Summary of Recommendations.

The following is recommended:

1. Preparations should be made by the Coachella Valley Storm Water District to spread flood waters over the gravel areas below Whitewater and Tahquiz canyons to the extent of 2,000 second-feet, or to the extent of preventing water reaching below Point Happy.

2. Surveys should be made to determine the best location and sizes for ditches for spreading water, the number of diversions that can be advantageously made, the area available for spreading over, the character of headworks required and the cost of the works.

3. Application should be made to the Secretary of the Interior to have withdrawn from entry and reserved for the conservation purposes of the district the public lands where water is to be spread over the gravels. Arrangement should be made with the Southern Pacific Company for the use of railroad lands in the same areas.

4. Application should be made to the State Water Commission for the right to use as much of the flood waters as the district intends to store in the gravels.

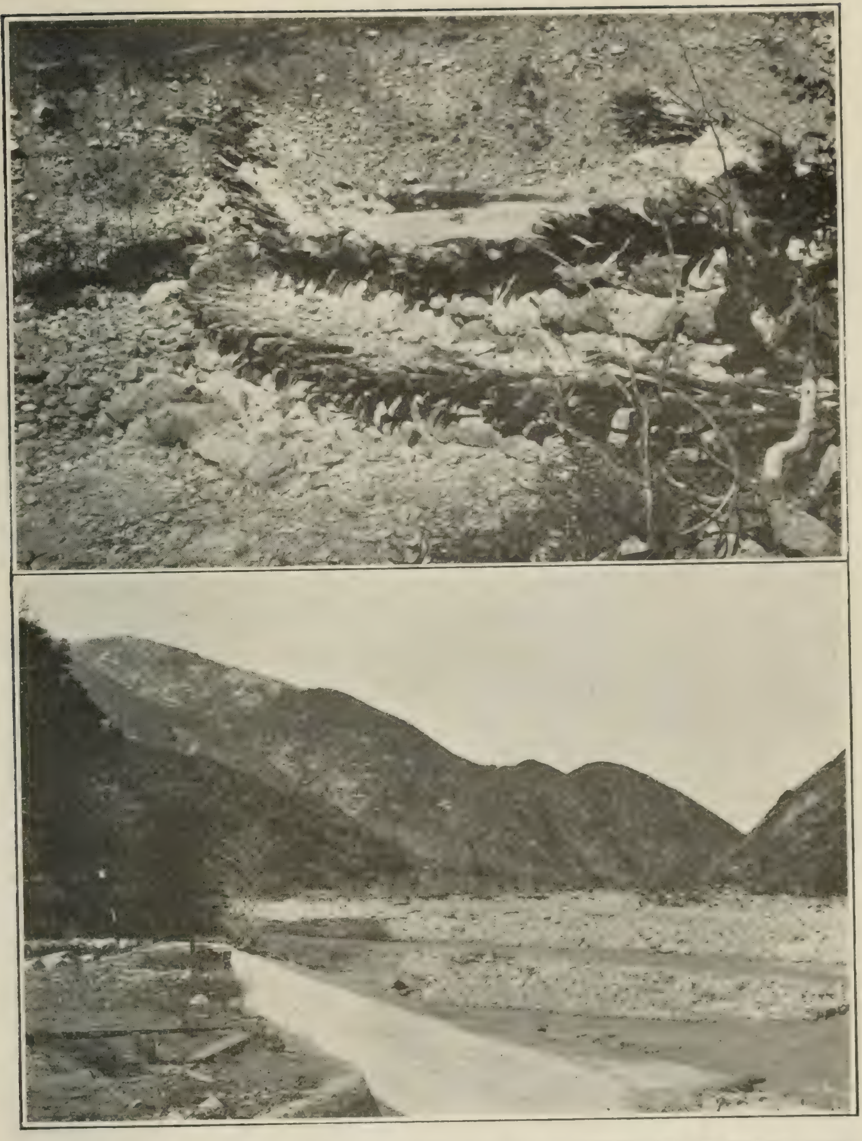


Plate XIII, Fig. 1 (upper).—Rock and brush check dam constructed by Los Angeles County in Haines Canyon. The double crest dissipates the force of the overflow. The dam is depressed where it will concentrate the overflow on the larger rock in the natural stream bed. Fig. 2 (lower).—Lytle Creek at head of Fontana ditch.

5. While the water line of the high flood of January 17, 1916, is still visible, a cross-section should be made of the channel of Whitewater River at Point Happy and the grade determined for one mile past the point from which to calculate the capacity needed in a storm drain in Coachella Valley.

6. Preliminary surveys should be made of routes for a storm drain on both sides of Coachella Valley in order to compare cost and adaptability. The surveys should include determination of the grades and whether a single levee would suffice or whether a double levee would be necessary.

7. The district should, through its organization, aid the district attorney of the county in enforcement of the law for the closing of flowing wells when the water is not in use, except in cases where it is impracticable to close the wells.

Dated May 31, 1916.

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